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Steel Industry Must Become Distribution-Minded

By JOHN H. VAN DEVENTER
Editor, THE IRON AGE

DEPRESSIONS have come and gone, but the steel industry has always forged ahead again with renewed vitality. Will history repeat itself or must steel adapt itself to permanently changed conditions?

The author, who delivered an address at the sixth annual open meeting of the Metallurgical Advisory Board to the Carnegie Institute of Technology at Pittsburgh, Oct. 28, believes that the steel industry entered an entirely new phase of its history as long ago as 1918 and that adjustment to that phase is the imperative need of the present time. The progress of the industry, he declared, has followed an "S" curve—in its infancy creeping, in its expansion stage running, and its third, or present stage, walking. The quest for increasing volume, which characterized the second or expansion stage, was the natural outcome of a condition of rapidly increasing demand. But that period is ended and to be production-minded now is to be out-of-date.

Distribution, he asserted, will command the major attention of the industry in coming years. Haphazard marketing of steel products will give way to carefully planned and thoroughly organized merchandising. Wastes will be uncovered that are even larger than those which have been eliminated in production. Methods will be devised to break down distribution costs so that unprofitable selling can be avoided and more intelligent pricing can be effected. Markets will be resurveyed so that the altered relationships of consuming groups will be disclosed and the supremacy areas of different products will be clearly defined. Technical research will reinforce market research in fitting products to known needs and in finding needs for existing products, he pointed out.

Distribution is no new catchword to which the industry will give temporary lip service. On the contrary, it calls for as systematic and thorough-going a regimen of research, analysis and education as production. Scientific distribution, Mr. Van Deventer asserted, will mean shaking off the shackles of tradition; it will mean getting into an entirely new attitude of mind. It will mean preparing for a successful march across the Red Sea of adversity to the promised land of profits.

MY task tonight is to comment upon the outlook for the steel industry. The job could be done, with Coolidgeian brevity, in four words. The outlook is tough. But so is the industry. After standing the punishment that you have had for the past two or more years, nothing that an editor can say can add much to your sufferings. Therefore, instead of making the ideal four-word after-dinner speech, I shall attempt to give this dogmatic statement a factual basis.

Volume has been the grand fetish of most of American industry. The steel industry is no exception—and when I say "steel" I mean to include all the chief members of the ferrous metal family.

The striving for volume—mass—has largely dictated capital investment programs, turned competition into an unintelligent scramble to disperse assets through ruinous price policies, permeated and perverted merchandising plans and soured many fairly good dispositions. Volume and its corollary, price, have caused more headaches than has anything else in the steel man's well stuffed pack of troubles. Let's begin with volume, therefore, and discuss its outlook.

More and more we are coming to the belief that the old and accepted method of prognosticating future "normals" by projecting past performance upward in a straight line is both erroneous and deceptive. This practice has been customary in our industry and is probably one of the causes of overexpansion of capacity.

Steel in Final Phase of Growth

The steel industry is apparently no exception to the general law of industrial development in which three successive phases are noted. First is the phase of infancy in which the industry creeps, next comes the phase of expansion in which it runs, and third the phase of so-called stabilization or saturation in which it walks.

Thus, instead of a straight line being representative of growth of demand for the long term, we have an "S" curve stretching across the chart of volumetric progress.

Believe it or not, the steel industry stopped running and began to walk as long ago as 1918-1919. This is graphically shown by plotting the five-year averages of production of ingots in terms of consumption per capita since 1880. The bend of the curve which took place some 14 years ago was hidden by the stupendous outputs of 1928-9, plotting in terms of annual output, but is clearly disclosed by the five-year method. This significant alteration of pace, or slowing down, in rate of growth of demand is independent of the recent depression and occurred fully ten years before the depression began. If any of you would like to examine this theory in detail, you will find it presented in the leading article in THE IRON AGE for Sept. 15.

This "S" curve in the steel industry stands for stop, look and listen. It means that those who expect that volumes will spring back with increased vigor and follow the straight-line "normal" rate of increase are likely to be disappointed. It means, even

with the restoration of normal business, whatever that may be, that there will be an increased pressure, due to the causes which drew the "S" curve, that will bear down upon the trend line and tend to depress it.

Depression Losses Also Hold Back the Industry

To this depressing force must be added another, at least for a period of some years. This is the decrease in purchasing power due to depression losses of earnings, dividends, wages and the shrinking of surpluses. In the steel industry, unlike some others, this cannot be compensated for by price adjustment downward, because of the large element of uncontrollable overhead comprising taxes, freight, capitalization, etc., all of which especially penalize an overexpanded tonnage industry.

Other depressing forces could be cited, such as the dumping of foreign steel, the erection of trade barriers in foreign markets, the likelihood of still higher taxation and, indeed, the fact that you are making materials last longer and weigh less by improving quality. Enough has been said, however, to picture some of the increased adverse forces with which we shall have to contend and therefore the necessity of setting up counter forces to overcome them.

We must not fool ourselves when the initial "pick-up" comes, of confusing delayed demand with current normal demand. A good portion of the tonnage which will be sold in 1933 will be postponed buying from the two previous years and should be considered as such.

Some few optimistic brethren of our industry believe that the age of miracles is still with us. They are hoping for some unknown but wonderful new product to come which will do for the steel industry what the building of railroads and later the development of motor cars did for it. It may be that some such things will come, but, like the trains of a certain notorious railroad of the old days, it will not be safe to depend on their arrival. The counter forces must be planned and set up within the industry.

One of these, which is already making its appearance here and there, has to do with the state of mind within the individual organization and within the industry as a whole.

Steel Industry Inefficient in Distribution

With the exception, of course, of those present tonight, the steel industry, in past years, has constituted a horrible example of inefficient distribution. It has not sold itself or its products properly to its customers or to the public. It has seen other industries—some of them competing ones, some of them older and some of them younger—run rings around it in promotional work as well as in market analysis and coverage.

Of course, during the period from 1895, when the steel industry stopped creeping and began to run; when the steep part of the "S" curve traced its upward course, there was little need for intensive or scientific merchandising. Production was the keynote and the battle cry. The entire industry was production-minded, even in its selling departments. The thought was to grab the business in sight, not to discover and cultivate and develop unseen requirements.

When the industry stopped running and began to walk, in 1918-19, it was time for it to shift the emphasis from producing to merchandising. But steel had a hangover after its 23-year production spree. Even if it had not, it would have been impossible to revolutionize its state of mind on short notice. It has taken the cold water of a three-year depression to start doing that.

The salvation of the steel industry is for it to become distribution-minded. This is also true of the metal-working and machinery building industries which resell metal in their products. Not only distribution-minded in its sales activities, but in finance, production and research as well. Particularly, perhaps, is there need of this in the finance departments which we find nowadays to be full, not of "yes" men, but of "no" men.

Must Undertake Creative Merchandising

It requires distribution mindedness to undertake creative merchandising. And the extension of creative merchandising, with its relatives of product research, market analysis, breakdown of sales costs, lowering of sales resistance by the determination of technical supremacy areas, effective and intelligently selected and directed promotion, will form perhaps the strongest counter force that the steel industry can set up against the downward pressure on the volume curve.

Research, which is so well represented here tonight, will be the right arm of the future creative merchandising of the steel industry.

Some of us are old enough to remember the time when the general practitioner, or family doctor, was the chief source of reliance in case of illness. We recollect the one big bottle of pills that performed heroic service for a multiude of ills and which served for the generality of human disorders. Today we have the medical specialists and a tremendous diversification of remedies.

The Trend Toward Specialization

The steel industry of the past was like that. If people wanted steel they took what was to be had, out of the big bottle, so to speak. Today, thanks to research, they have the choice of a multitude of varieties and compositions, specifically suited to their needs.

Very few general medical practitioners made more than a bare living. But the trend to specialization changed the financial picture for the doctors. They had sense enough to charge adequately for the knowledge, skill and research going into specialized services. There is a thought in this for the steel industry. Research and the development of specialized materials offer an effective way to escape from the deadly price level of the pills in the big bottle. But bear in mind that in medical practice the patient does not establish the specialist's fee. If he had been allowed to do so, the specialist would soon be as poor as the average general practitioner.

While the trend today is distinctly toward an increasing proportion of specialized materials, for some years to come the major tonnage will still be from the big bottle. What can proper distribution practice do to sell these standard pills at a profit instead of giving them away without profit, or even at a loss?

Must Ascertain Costs of Distribution

I presume that the enlarged program of activity of the American Iron and Steel Institute will give considerable thought to this question. It is a difficult problem, but every problem has its possible solution. To the observer it would seem that there are a number of practical approaches.

For example, it is safe to say that in general the industry does not sufficiently know its cost of distribution. Until it breaks down the cost of sales as thoroughly as it has broken down and itemized its cost of production, it will not be in a position to formulate improved policies or to detect and eliminate present wastes.

I have talked with a number of sales executives on this subject and while most of them admit that this is true, most of them say that they do not see how it is possible to obtain sufficiently detailed distribution costs in order adequately to distinguish profitable from unprofitable effort. If this attitude is to prevail, you might as well stop where you are. The portion of profit margin which can be salvaged by the elimination of distribution wastes, in the years to come, is undoubtedly larger than that which we can hope to salvage from production wastes. Until specific distribution costs are known, you will not be in a position to act intelligently upon such questions as quantity differentials, direct selling of small lots versus warehouse sales, cross-hauling, marginal sales, junior salesmanship, etc.

Price differences established between various standard forms of product no doubt reflect differences in their cost of production. I wonder if they also adequately reflect differences in cost of distribution?

I offer these thoughts concerning the obtainment of adequate sales costs without having any definite so-

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Liquid Baths for Heat Treating—Medium-Temperature Salt Baths

By W. PAUL EDDY, JR.
Metallurgist, General Motors Truck Corpn., Pontiac, Mich.

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SALT baths of the medium-temperature class are used for heating carbon and many alloy steels for normalizing, annealing and hardening, for quenching and drawing high-speed steels, and for heating brass, bronze, nickel-silver, copper, gold and other non-ferrous metals and alloys for bright-annealing treatments.

Salt mixtures for use in the medium-temperature range are perhaps more varied in composition than are the low-temperature mixtures, but, in general, the mixtures are eutectics and are composed of chlorides or of chlorides and carbonates. Following are a number of formulæ which may be used with more or less success:

	Per Cent
IX. Calcium chloride	70
Potassium chloride	5
Sodium chloride	25
Melting point, 932 deg. F. (500 deg. C.)	
Use 1000 to 1600 deg. F. (540 to 870 deg. C.)	
X. Calcium chloride	72½
Sodium chloride	27½
Melting point, 940 deg. F. (505 deg. C.)	
Use 1000 to 1600 deg. F. (540 to 870 deg. C.)	
XI. Calcium chloride	30
Potassium chloride	50
Sodium chloride	20
Melting point, 986 deg. F. (530 deg. C.)	
Use 1025 to 1600 deg. F. (550 to 870 deg. C.)	
XII. Sodium carbonate	50
Potassium chloride	50
Melting point, 1040 deg. F. (560 deg. C.)	
Use 1100 to 1500 deg. F. (595 to 815 deg. C.)	
XIII. Sodium chloride	50
Potassium carbonate	50
Melting point, 1040 deg. F. (560 deg. C.)	
Use 1100 to 1500 deg. F. (595 to 815 deg. C.)	
XIV. Potassium chloride	45
Sodium chloride	10
Sodium carbonate	45
Melting point, 1100 deg. F. (595 deg. C.)	
Use 1150 to 1500 deg. F. (620 to 815 deg. C.)	
XV. Sodium chloride	35
Sodium carbonate	65
Melting point, 1150 deg. F. (620 deg. C.)	
Use 1200 to 1500 deg. F. (650 to 815 deg. C.)	

THIS is the fifth in a series of articles on liquid baths for heat treating. In this the author discusses medium-temperature mixtures, one of the three classes into which he divides salt baths in general. In the next installment the author will continue his discussion of this class of mixtures, dealing especially with rectifiers for them. Previous articles in the series included those on oil and lead baths in THE IRON AGE of Sept. 1, on cyanides in the issue of Sept. 15, on salt baths in general in that for Sept. 29 and on low-temperature mixtures in the issue of Oct. 20

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XVI. Barium chloride	77¾
Sodium chloride	22¼
Melting point, 1175 deg. F. (635 deg. C.)	
Use 1225 to 1600 deg. F. (665 to 870 deg. C.)	
XVII. Potassium chloride	56
Sodium chloride	44
Melting point, 1228 deg. F. (665 deg. C.)	
Use 1275 to 1650 deg. F. (690 to 900 deg. C.)	
XVIII. Potassium chloride	46
Sodium chloride	34
Boric anhydride (B_2O_3)	20
Melting point, 1250 deg. F. (675 deg. C.)	
Use 1300 to 1650 deg. F. (705 to 900 deg. C.)	
XIX. Potassium chloride	70
Sodium borate (borax)	30
Melting point 1300 deg. F. (705 deg. C.)	
Use 1350 to 1650 deg. F. (730 to 900 deg. C.)	

Calcium Chloride as a Constituent

In considering the above mixtures there are certain points which must always be kept in mind. Calcium chloride, as is well known, is very hygroscopic—in fact, it is deliquescent—so that any mixture containing this salt has to be handled in certain distinctive ways. First, the cans in which the salt is kept must be air-tight. Second, provision should be made to carry off the fumes from the bath, by hooding the furnace, in order to prevent gradual rusting or corrosion of all metal within a radius of several yards of the furnace. Third, work must be very thoroughly cleaned after heating in a calcium chloride bath mixture, else the work will rust in the course of a day or two, the rate of rusting depending on the atmospheric humidity.

The cleaning of work quenched in water or brine, or cooled in air, after heating in a bath containing calcium chloride, is simple—merely wash in hot clean water. If the work is quenched in oil, however, it cannot be washed in any of the usual oil-cleaning solutions, such as soda ash or trisodium phosphate, as insoluble calcium carbonate or phosphate will form on the work. First, immerse in vigorously boiling hot clean water or wash in a hot clean water spray until all the salts are removed, and then remove the oil, if necessary, by the usual methods.

In spite of these precautions, and even with the addition of a sand-blasting or brushing operation, work frequently rusts if allowed to stand a few days without grinding. Probably the best method consists of alkaline and acid electrolytic cleaning, followed, if necessary, by sand or shot-blasting or scratch-brushing.

From the above, it will be painfully evident that calcium chloride is not a desirable constituent of salt baths, and such is indeed the truth. On the other hand, it is not possible with inexpensive salts (with the knowledge available at present) to make a salt mixture which melts below about 1040 deg. F. (560 deg. C.) and which can be safely used above about 1150 deg. F. (620 deg. C.) without using calcium chloride. So there may be cases where the advantages of such a bath outweigh the disadvantages of calcium chloride.

Barium chloride is not nearly as hygroscopic as is the calcium salt, but it is just as difficult to clean. Furthermore, there is no temperature range attainable with barium chloride mixtures which cannot be covered by

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All-Welded Steel Tie Made B

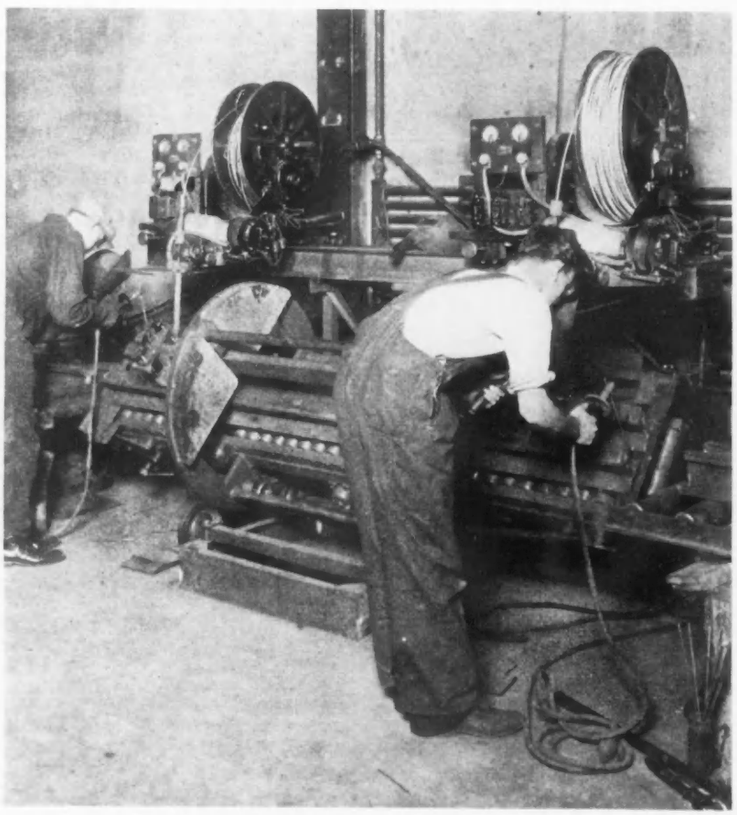
IN a recent issue of THE IRON AGE the problem of the steel railroad tie was analyzed, but the conclusions reached were somewhat at variance with the experience of the Delaware & Hudson Railroad Corpn., which operates some 25 miles of standard-gage track over steel ties. This company has designed a tie especially suited to its needs and has placed the production on an efficient basis through the use of automatic welding heads, roller conveyors and special jigs. Some of the principal features in this method of producing steel ties at a total cost of under $4 a tie are described in the accompanying article.

The possible market for the steel tie in this country may be appreciated from the fact that some 430,000 miles of standard-gage track using 2600 ties per mile would require over 290,000,000 tons of steel ties.

THE all-welded steel tie, which was introduced some years ago, has been gradually gaining favor with several railroads, even though total national demand for steel ties has declined. The Delaware & Hudson Railroad Corpn. in particular has adopted this tie for all cinder pit construction, and has placed its manufacture on a quantity production basis. Ties as manufactured by this company consist of two lengths of used rails laid with their bases butting together and fastened rigidly by means of standard tie plates welded in place. Angle bars 24 in. long are welded across the ends of the rails to prevent spreading of rails, end-wise creep of tie in service, and to act as tie spacers. A complete tie built of 80-lb. used rails weighs about 500 lb., made up of about 410 lb. of rails, 88 lb. of tie plates, angles and rail clips, and 2 lb. of welding electrodes.

The tie thus made forms a unit of surprising rigidity and with a broad bearing surface on the ballast. The design is well suited to railroad work, for the tie plates insure true cant and exact gage, since they are welded to straight, uniform surfaces. The end plates space the ties and transfer thrust from one to another, and the deep, concave sides of the ties which come in contact with the ballast give a maximum resistance to displacement. The rails are held in place on the ties by clamps, which in turn are held by spring steel keys. In cases where a standard type of rail is used the clamp is of plain U-shaped design. An adjustable clamp has been designed, however, for use where several types of rails are encountered.

The equipment, as used by the Delaware & Hudson Railroad, for producing steel ties, consists of a cutting bench to which the used rails are delivered by cranes, standard acetylene cutting equipment for cutting the rails to the desired length, a roller conveyor and an automatic arc welder. The crew consists of a rail cutter, two welders and a helper. The helper pushes the cut rails into the welding shop and keeps the welders supplied with tie plates, angles, electrodes, etc. He also helps load the finished ties on to gondola cars. Jigs and clamping devices help make the welding operation efficient and practically automatic.



Two automatic welding heads operate simultaneously with the hand welders.

Automatic Welders Used

The general scheme of welding is shown at left. The rails are carried to the welding machine on the roller conveyor at the left. They are then run on to the machine on rollers set into the cradle bed, and are automatically clamped into correct position. The tie plates then are set into jigs which accurately determine their position and which hold them firmly against the rails. The cradle is mounted so that it may be rotated to present any desired angle to the two automatic welding heads which simultaneously weld one side of the two plates to the rails, while the operators at the same time weld the angle bars by hand. The cradle is then rotated 90 deg. and the opposite sides of the tie plates and the angle bars are welded. After welding, the tie is released and rolled out to a loading platform. The entire operation

de By Delaware & Hudson

By BERNARD C. TRACEY
General Electric Co., Schenectady

RECORD OF COSTS OF STEEL TIES AS PRODUCED BY THE DELAWARE & HUDSON RAILROAD

Material	Cost Per Tie
411 lb. of scrap rail at 80 lb. ASCE at $8	$1.65
54 lb. scrap angle bars at $10.20	0.25
Two tie plates, 25 lb. at 27c. each	0.54
Two sets (two each) triple springs at 18c.	0.36
110 lb. welding wire	0.09
7.333 cu. ft. of oxygen at 41.34c.	0.10
0.76 lb. welding wire	0.05
2.50 cu. ft. acetylene at 2.64c.	0.07
Grand total for material	$3.11
Labor	
Cutting, piecework contract	$0.04
Welding, piecework contract	0.16
Total	$0.20
Electric current	0.10
Plus 15 per cent supervision, etc.	0.58
Grand total, material, labor, current, etc.	$3.99

Summary

Material	$3.11
Labor	0.20
Electricity	0.10
Supervision	0.58
Total	$3.99

Cost of the treated wood tie, having no scrap value, $3.

takes about 5 min., so that an 8-hr. daily output of from 80 to 90 ties is obtained.

In laying the track with steel ties, no gaging is necessary, as the gage of the track is accurately set on the tie itself. No spikes are used. The clamps and steel spring keys that hold the rail to the tie can be locked in place in a fraction of the time required to drive spikes. These advantages greatly simplify the process of laying track. Where it is practical to remove the old rails and ties and relay a reasonable length of track, the labor cost per tie is about the same as that for a wooden tie, despite the difference in weight.

Detailed costs have been compiled by the Delaware & Hudson shops at Colonie, N. Y., and while individual

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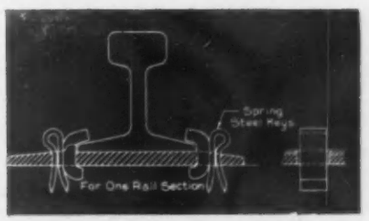
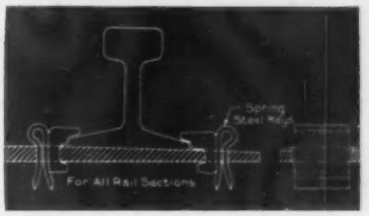
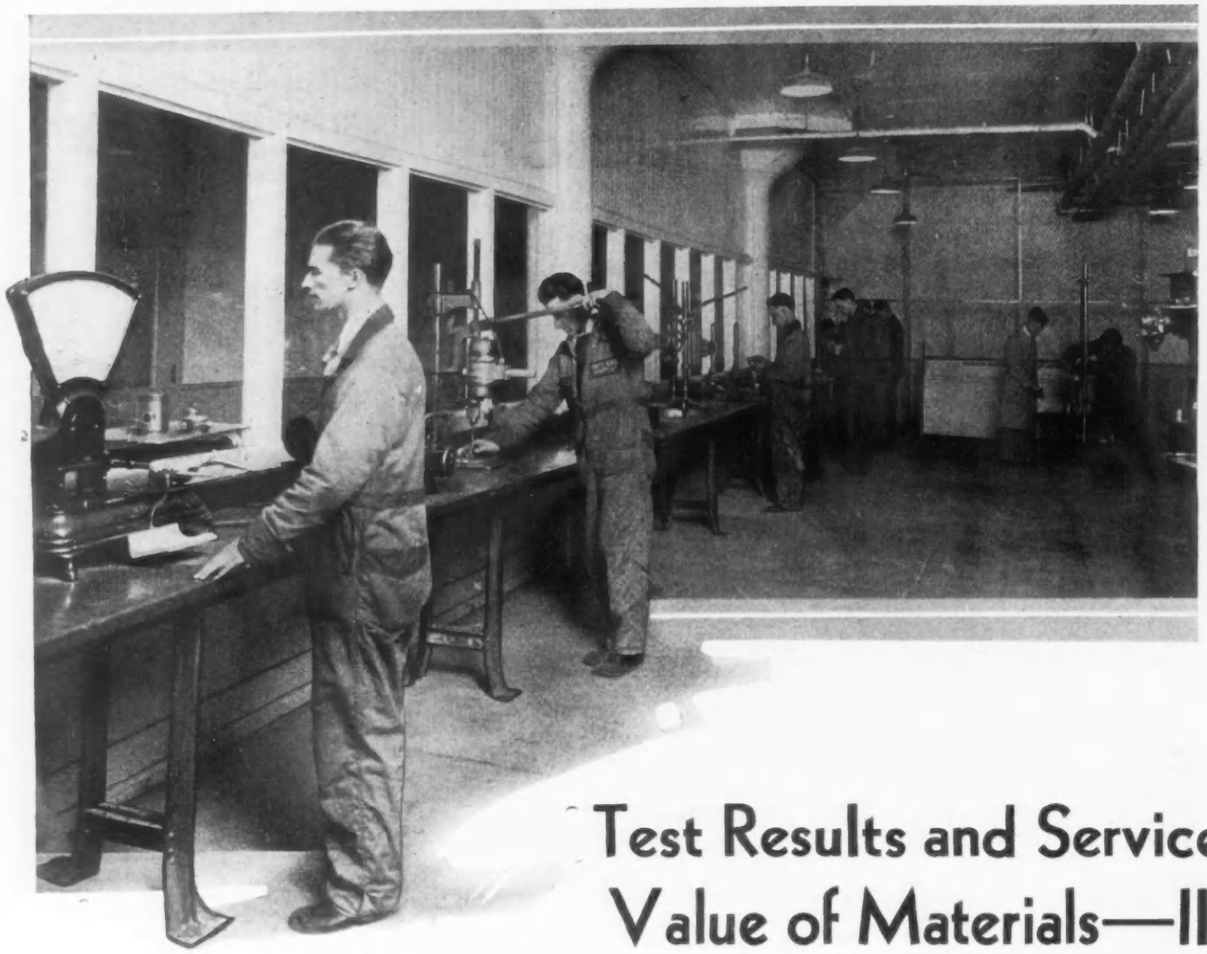
(Above) The completed ties are run out on a gravity roller conveyor to a platform from which they are loaded into freight cars by electric hoist.

(At Left) This shows a section of track under construction using the Delaware & Hudson Railroad's steel ties.





(At Right) The use of spring steel keys for fastening rails to ties increases the speed of laying track.



Test Results and Service Value of Materials—II

By H. F. MOORE
Research Professor of Engineering
University of Illinois, Urbana, Ill.

SEVERAL typical laboratory test results may now be considered—their accuracy, their uniformity, and their significance.

The Test for Tensile Strength

First let us take *tensile strength*, the pull per square inch of cross-section which a material will stand before fracture. For ductile metals the accuracy of this test value is usually very high and with uniform metals it can be repeatedly obtained within a very close range. In the standards of the A. S. T. M. there is recognized a rather crude method of calibrating testing machines by determining tensile strength of specimens of ductile metal tested on a standard machine and of other specimens cut from the same bar tested on the machine to be calibrated. Individual test results for each machine are discarded if they do not come within one per cent of the average results for a set of specimens. For some three years the speaker has given this calibration test as a class exercise in his advanced laboratory practice. During that time some 25 or 30 sets of specimens have been run and only two or three individual results have had to be discarded.

In the case of brittle materials the determination of the tensile strength is far less exact. The yield and plastic flow of ductile materials tends to make the stress on the cross-section of a specimen uniform, so that the assumption of uniform stress, which is made in computing tensile stress, is very closely correct. In brittle materials, on the other hand, there can be very little of this plastic readjustment, and it has been found extraordinarily difficult to secure axial tension and uniform stress distribution for such materials. This is especially true for short specimens. Even if the specimen is gripped evenly all around and loaded axially, there is a considerable unknown variation of stress from axis to surface of specimen. For this reason tensile tests are not very much used for brittle materials and, when they are made, they are so sensitive to variations in gripping that the results are apt to show a pretty wide scatter. In general, cross-bending tests give better results for brittle materials than do tensile.

For ductile metals the tensile strength does not have any very direct significance. With the exception of chains and bolts, it can rarely be developed without such distortion that the piece fails to function. Indirectly, however, it seems to have considerable significance. For any given class of metals the elastic strength and the tensile strength seem to have a rough correlation and the tensile strength also seems correlated with the limiting stress for endurance under repeated loading. Both these correlations are rough, but the second, at least, is serviceable.

If a brittle material were used in tension, the tensile strength would be a directly significant value. However, owing to the tendency of brittle materials to snap off without warning, they are rarely used in direct tension. In the case of wood it is so difficult to devise a test piece which will fail by tension rather than by shearing

along the grain that the tensile test is rarely used. In rope, and wire rope, and in belting, the tensile strength is of very direct and evident value.

Compressive Strength of Ductile Materials

The ultimate compressive strength of ductile materials is impossible to determine. Short compression test specimens flow and expand laterally so that ultimate strength cannot be determined. Ultimate strength is sometimes reported by an arbitrary measurement of deformation. The writer does not believe this gives any real ultimate strength, and doubts whether such a test is of much value. For brittle materials compressive strength is a fairly definite test result; though it probably represents destruction by shearing action, or by lateral strain, rather than by direct compression. It would seem to be a good indication of service strength for brittle materials under compressive loads.

The cross-breaking strength, or modulus of rupture, can be obtained only for rather brittle materials. It is correlated with the tensile strength, but owing to the fact that even most brittle materials flow somewhat before fracture its value is always higher, and frequently much higher, than that determined by a tensile test. This difference may be partly due to the extreme difficulty of getting a tensile test of brittle material in which the stress is uniformly distributed over the cross-section of the test specimen, and the difference is doubtless partly due to the fact that even the metals which are classified as brittle exhibit some plastic action, stress ceases to be proportional to strain, and the actual developed stress falls below the computed stress.

Meaning of Elastic Limit

Elastic limit, proportional limit, and yield point are terms used, unfortunately quite loosely, to denote the limit of pure elastic action in a metal. A vast amount of discussion upon this limit of elastic action is on record. Suffice it to say that for most metals there is a region below which the action of the metal is almost purely elastic and above which distinct plastic action predominates. The values located by various tests for elastic limit, proportional limit, and yield point, when carefully analyzed, seem to be arbitrarily determined values lying within this range.

For ductile metals, and especially for structural steel, this range of stress between elastic and plastic action is quite narrow, whereas for many non-ferrous metals and cold-worked metals it is much wider. The writer believes that it should be frankly recognized that any test for determining a limit of elastic strength should be recognized as arbitrary. He calls attention to the discussion of current and proposed methods for determining practical "yield strength" in the 1931 *Proceedings* of the A. S. T. M., Part I, report of committee E-1 on methods of testing, and to the proposed methods of test submitted by the section on elastic strength.

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CONCLUDING his discussion of the service value of materials as indicated by conventional tests (THE IRON AGE, Sept. 8), the author deals in this article with the accuracy, uniformity, and significance of tests for tensile strength, elastic limit, fatigue and creep. Any test for determining a limit of elastic strength should be recognized as arbitrary, he believes. As to fatigue limits, he says: "Do not use the test unless it seems to give results closely correlated with the service required."

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The service significance of the elastic strength is certainly very great. This is especially true of structural members under compression where any very great amount of plastic action may lead to a disastrous collapse of a whole structure. The elastic strength is also of importance in machine parts, many of which cease to function if any serious amount of distortion takes place. In brittle materials the location of elastic strength becomes almost purely arbitrary, and it is doubtful whether any such limit for any brittle material is of very great practical significance.

Questions Value of "Accurate" Elastic Limits

In this connection the speaker wishes to question the service significance of "elastic limits" determined by methods of extreme precision. In the first place it is extremely difficult to reproduce the results. Slight variations of testing methods and apparatus change the values of such delicately determined limits widely. In the second place a slight inelastic action can usually be determined at almost any stress providing the methods used are sufficiently delicate. In the third place the writer knows of no evidence that these extremely small amounts of plastic action cause any appreciable structural damage to a member so long as they are not repeated thousands of times. The writer believes that some of the arbitrary testing methods which determine the stress at which evidence of a certain definite amount of plastic flow appears give more significant values of elastic strength than do extremely delicate methods.

The questions of ductility and of impact tests have been briefly mentioned in the foregoing paragraphs. Suffice it to note here that the question of the *significance* of these tests for service results is probably shrouded in much more uncertainty than is the question of accuracy of tests.

Endurance or Fatigue Limits

In recent years two new limits of strength have been reported from many testing laboratories. The first of these is the endurance limit or fatigue limit, a limiting stress below which a material will stand an indefinitely large number of cycles of stress without failure. This limit can be determined with a fair degree of precision, but its determination at present involves a series of tests on six or more specimens, and requires from a week to a month, on account of the long-time tests which are necessary to determine it. So far machines and methods of testing for this limit have not been standardized, though a type of machine which has been in use for the past 75 years is the one most commonly used.

The significance of this limiting stress is a matter of considerable debate between testing engineers, machine designers, and steel makers. It would seem at first that this limit has a rather direct bearing on the ability of a material to withstand repeated stress. Perhaps the clearest case is that of metal to be used in a spring subjected to a wide range of stress, with excessive deflection prevented by stops. In this case the endurance limit would seem to be of marked direct significance. It would seem to be of very considerable significance for shafts, axles, wire ropes, railroad rails, and many other machine and a few structural parts. Owing to the fact that for steel this limit seems to be fairly closely correlated with the tensile strength, the fatigue test has not as yet made its appearance in specifications to any great extent, but resistance to repeated stress is judged from the tensile strength. It should not be judged by any kind of elastic limit.

In this connection it seems wise to emphasize the fact that very few structures are in danger of fatigue failure. Failure by buckling when the elastic strength is exceeded is a far more imminent danger. It is in machine parts that most fatigue failures occur, and even in this field it should be emphasized that many machine parts are in no particular danger of failure by fatigue. Many pressure vessels have the load on them repeated only a few hundred times, which hardly brings fatigue strength into play. The case of the steam boiler where the stress may be repeated a few thousand times in the life of the boiler seems a border line case.

We may say with reference to the fatigue limit as with reference to any

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Deep Drawing of Rustless Steels

By DR. M. H. SOMMER

INTRODUCTION of the rustless steels has presented new problems in the deep drawing of metals. A die suitable for one composition of rustless steel may not be applicable to another. The author of this article, who is a graduate of the University of Berlin, Germany, and who has had considerable experience in the rustless steel industry here and abroad, shows how to calculate the number and extent of the draws necessary to produce a given article.

DEEP drawing in general covers the processes by which sheet metal is plastically deformed at ordinary temperatures. The stresses imposed are beyond the yield point, but below the breaking point of the particular metal. As will be shown later, this range between yield and breaking point (not ultimate strength), expressing the plasticity of the material, is rather wide for ductile metals and for some of the rustless steels.

Since a large percentage of the sheet metals is formed or drawn into articles of some kind, the steel companies have been called upon to furnish material in the best possible condition for such applications. It is not always the metal in its absolutely softest state with the smoothest surface which gives the best results in deep drawing. It has required many years of study and practical research to find out the most desirable condition of the metal for intricate drawing operations. It is generally acknowledged today that a deep-drawing stock requires primarily great cleanliness of the metal, high uniformity in structure and all the plastic ductility inherent in the metal.

These requirements involve the full range of steel mill operations from the melting down to the final cold rolling, including all the chemical and other treatments necessary in the course of production. The problem has been very well solved for copper, brass, iron and steel and other metals commonly used for deep-drawing applications of all kinds. Any steel company can furnish today a "deep drawing" or "extra deep drawing" stock on request, fulfilling entirely the requirements for which the material is to be used.

Rustless Steels for Deep Drawing

The rather recent development of rustless steel and the great variety of such compositions offered to the trade have delayed the establishment of proper standards for deep drawing these steels and have confused the consumer as to their inherent properties for stamping operations. Steel mill practice for these steels is still in its infancy and the necessary requirements of cleanliness, uniformity and plastic ductility have not been completely worked out as yet. In fact, great difficulties have arisen in nearly all mill operations.

The formation of chromium oxides and slag inclusions are difficult to avoid and cannot subsequently be eliminated from the metal. There is further a possibility of forming an excessive amount of chromium carbides, due to the tendency of the chromium to combine preferably with the carbon in the metal. These chromium carbides are not desirable for deep drawing stock, since it is generally believed that the hard spots appearing in the material under the cold working strain of drawing operations are caused by them.

The temperatures required for rolling rustless steel are usually high and produce a tight scale on the surface, for the removal of which strong acid solutions are necessary. These solutions must be of such concentration to be effective that they often prove harmful to the surface of the metal itself and even penetrate into the body of the material. Subsequent operations cannot restore the original surface, and rustless steels thus damaged should not be used for deep-drawing operations, as the weak surface is easily overstrained and shows the so-called "orange-peel" effect with which everybody who has fabricated rustless stampings is familiar.

Heat Treatment Between Rolling

The heat treatment necessary between cold rolling operations of rustless steels to soften the material for further cold reduction has been greatly simplified through the adoption of various bright annealing processes which eliminate the strong acid pickling. It is very important, however, that the reduction in cold rolling of rustless steels be kept within certain limits to produce a refinement of the crystal grain which, after softening the material by annealing, gives the greatest amount of plastic ductility. The importance of this fact is very often overlooked and accounts for the difference in hardness of material from the same heat which has been cold rolled to different gages.

Besides all these difficulties the greatest confusion is created through the large variety of compositions of rustless steels on the market. Furthermore, small changes of some ingredients in the metal are likely to produce wide differences in the chemical and physical properties of the material. This refers especially to the content of carbon which, for deep drawing rustless steels, is generally low, say below 0.10 per cent, but which by varying only a few points might increase the breakage in deep-drawing operations considerably. Depend-

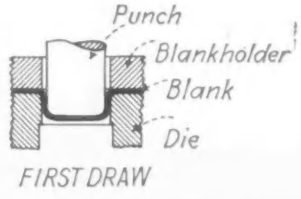

Fig. 1.—Characteristic first operation in the drawing of a metal showing the various parts involved.

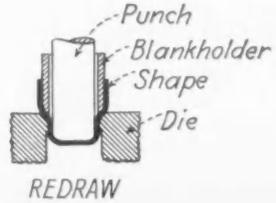

Fig. 2.—Details of the second draw, or redraw, if the product cannot be completed in the first draw.

ing on the chromium content the carbon content of the material must be closely controlled to give a uniform material and avoid the "hard spots" referred to.

Regarding the so-called straight chromium steels which contain chiefly chromium and iron, there are certain ranges of chromium which should not be used at all for drawing purposes, no matter what the requirements for corrosion resistance, strength, etc., might be. This is the range from 14 to 16 per cent of chromium where the physical conditions change rapidly upon small changes in the constituents of the rustless steel. Enough literature and publication of research work has appeared, especially within the last few years, to enlighten the metallurgist on the various compositions and their physical properties.

Unfortunately the ultimate user has not, in most cases, the facilities to enable him to pass on the qualities of the type of rustless steel he intends to use for deep drawing. Specifications cannot be worked out as yet, since the steel companies would not be able to meet them, at least not at prevailing raw material prices. This leaves for the ultimate user nothing else to do but to face once in a while excessive breakage, spoiled tools and dies, and difficulties in his finishing operations. The consequence of such experiences is that an exorbitant price has to be charged for the finished product to cover the losses in production.

Calculating the Drawing Operations

These conditions force upon the manufacturer a more correct and more reliable method of laying out the drawing operations and designing the dies than heretofore used. In a great number of plants the design of new dies has been and is still conducted by the cut-and-try method, whereby success can be only expected if sufficient experience has been gained on the behavior of the metal in similar operations. In the case of very ductile metals, such as brass and copper, even a faulty design of the drawing dies might turn out satisfactorily because there is sufficient ductility to spare.

There is also required a more complete understanding on the part of the factory engineer of the actual drawing process and the forces acting upon the metal and the changes in the metal itself. Before going into this in greater detail and showing the drawability of the more commonly used grades of rustless steel in comparison with the metals which are very familiar to the fabricator, a few formulas for the calculation of drawing operations, which are based on experiments, are suggested. While these methods are more or less crude, they make a quick calculation possible and can be successfully used for most grades of rustless steel. There are some exceptions, which are discussed later.

The characteristic drawing process is shown in Fig. 1 for a first operation draw and in Fig. 2 for a subsequent operation, if the stamping cannot be produced in one draw. These are self-explanatory to anyone familiar with such operations. The necessary size of the blank for any shape to be drawn can easily be figured under the assumption of equal volume and no change in the thickness of the material before and after the draw. The latter supposition is not correct, particularly for the straight chromium type of rustless steels, but the calculation in this way is sufficiently accurate, since allowance has to be made for enough material to trim the edge after drawing and the final blank size can only be determined through actual trials.

The following symbols are used in the calculations:

D = diameter of the blank, in inches.
d = diameter of the shape after the first draw, in inches.
d_1 = diameter of the shape after the second draw, in inches.
d_2 = diameter of the shape after the third draw, in inches.
m = ratio of each subsequent diameter to the previous diameter as d/D, etc.
s = thickness of the material, inches.

After the diameter of the blank D has been found, the diameter to which this blank can be drawn in one draw can be taken from the table, which shows values of m for various metals. These values for m are the summary of many experiments by plant engineers here and abroad over a period

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DETERMINING GRAPHICALLY THE STEPS IN DEEP DRAWING

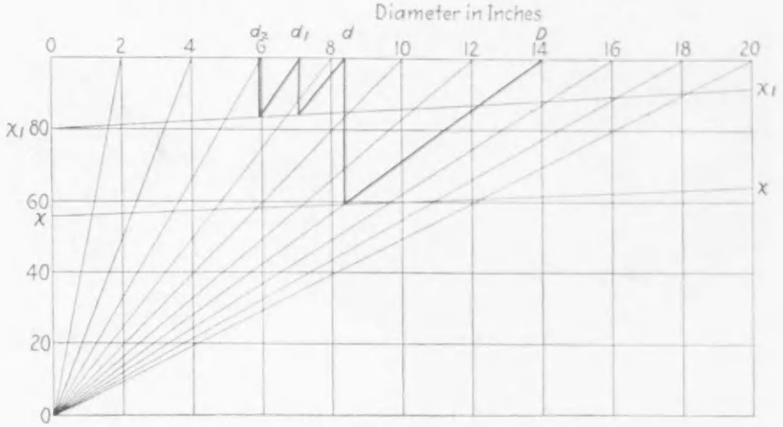


Fig. 3.—18-8 Rustless Steel, No. 24 U. S. Gage

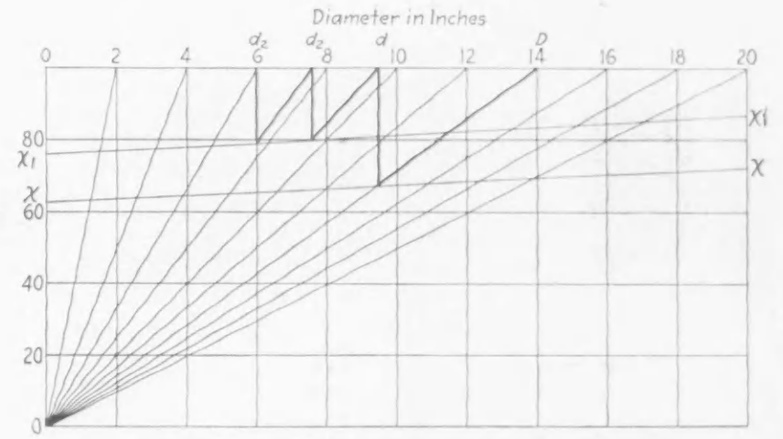


Fig. 4.—17 to 20 Per Cent Chromium Rustless Steel, No. 24 Gage

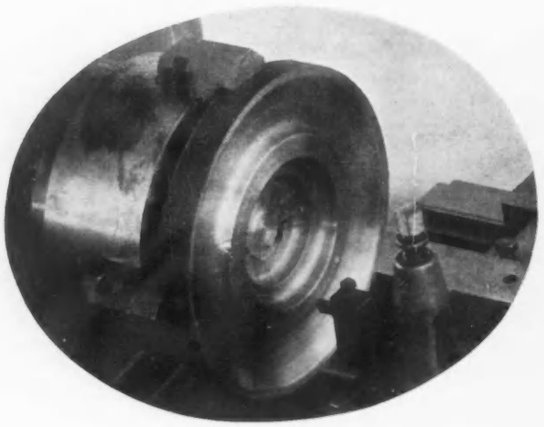
ASSUME the problem to be the forming of a rustless steel shape of a final diameter of 6 in. and a final depth of 6 in. First, the diameter of the blank must be determined. In this calculation it may be assumed that there is no change in the thickness of the material before and after the draw. Then the area of the blank will be equal to the combined areas of the barrel or cylinder (6 in. in diameter and 6 in. deep), and of the bottom (or 6-in. circle) plus an allowance for trimming. In other words $\frac{\pi}{4} D^2 = \frac{\pi}{4} d^2 + \pi dh$ + trimming allowance. From this it will be found that D is equal to 14, when d and h are each 6.

In using the charts, draw a line from the point 14 to the zero point. Where it crosses the X—X line, a line is drawn vertically intersecting the top boundary at a point representing the diameter to which this type of steel can be drawn in the first draw.

For the next and subsequent steps, a line is drawn from the d point through the zero point and where it crosses the X'—X' line, a vertical line is erected meeting the upper boundary at a point representing the next diameter, and so on.

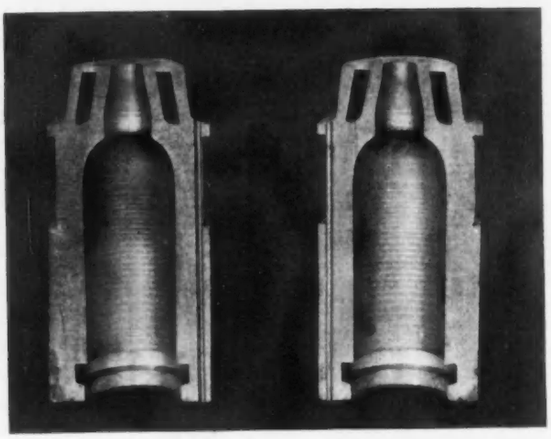
"Better Times"—

Ninth in a series of "Performance Pages" as selected from actual practice by The Iron Age Editors



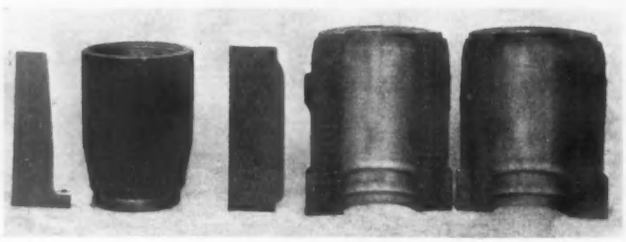
Die

Previous method, 8 hours.
Present method, 1 hour and 30 minutes.



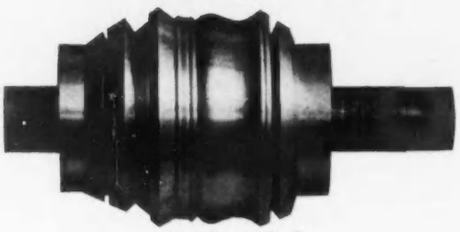
Quart Glass Bottle Mold

Previous method, 3-4 hours.
Present method, 40 minutes.



Bottle Mold

Present method, a 5 to 1 saving of time is usual in making bottle molds.

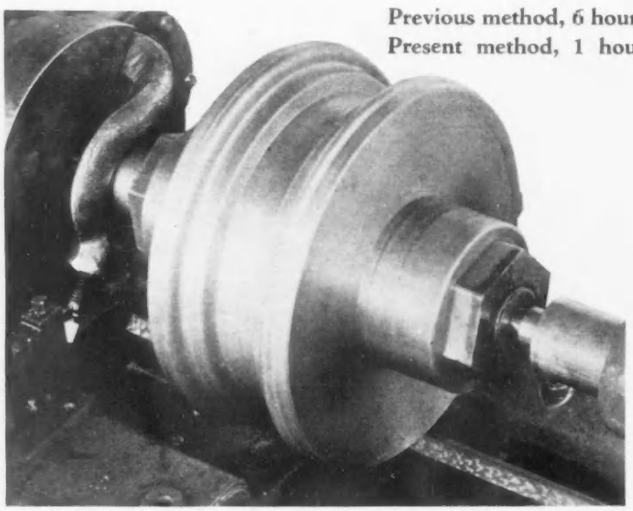


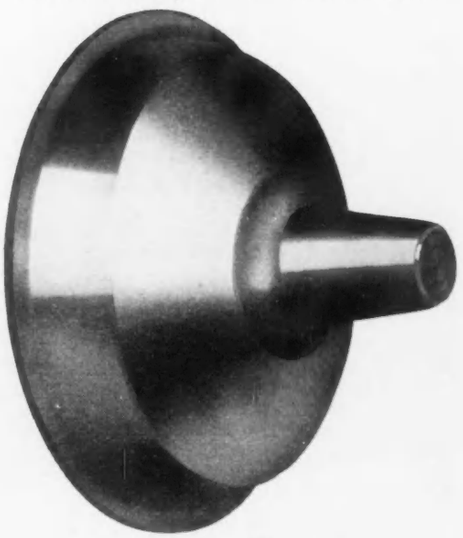
Molding Roll

Previous method, 13 hours.
Present method, 4 hours and 35 minutes.

Mill Roll

Previous method, 6 hours.
Present method, 1 hour.





Spinning Chuck

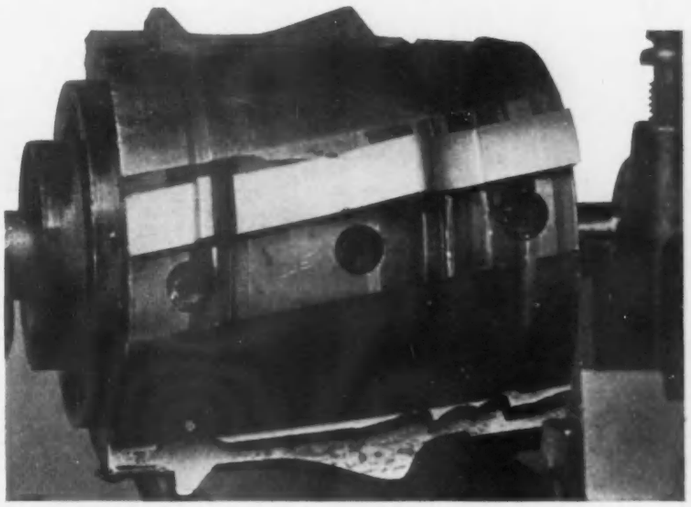
Previous method, 12 hours and 30 minutes.
Present method, 2 hours and 30 minutes.

PRODUCTS: Dies, Spinning Chucks, Milling Cutters, Mill Rolls, Molding Rolls, Bottle Molds, Punches and many irregular shapes.

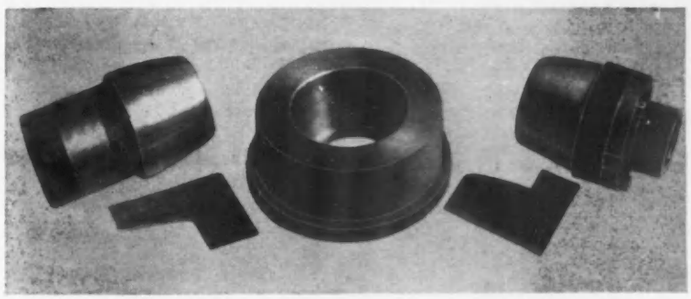
OPERATION: Turning, Facing, Boring—AUTOMATICALLY.

PRODUCTION EQUIPMENT: Monarch-Keller Form Turning Machine.

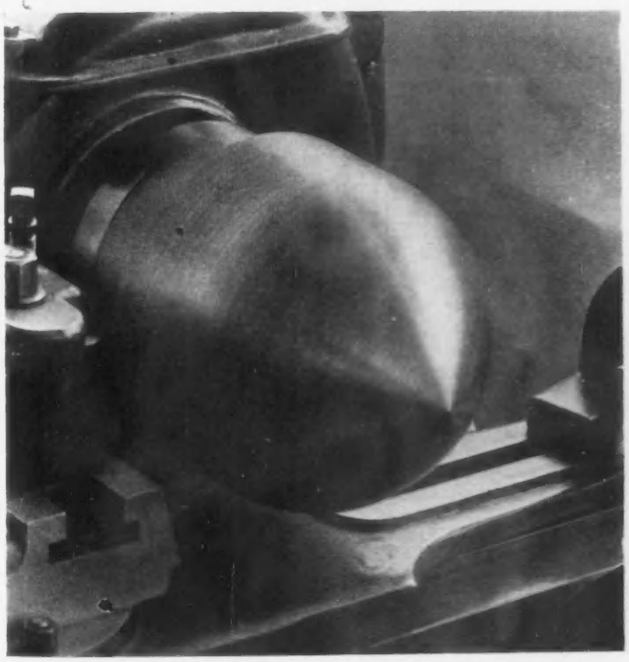
THE "we have always done it that way" group is being pushed into the discard these days by the "how can we do it better" group, as is shown on these two pages—the ninth in a series of "Better Times." Here we show one operation previously taking from 25 to 30 hr., now taking only 4½ hr. by the use of modern equipment; and another formerly taking 8 hr. now being done in 1 hr. and 30 min. This saving of both machine and man time is all important in the final pricing of the finished product. The examples are from current installations, and the time rate comparison is with good practice immediately preceding the introduction of the new method.

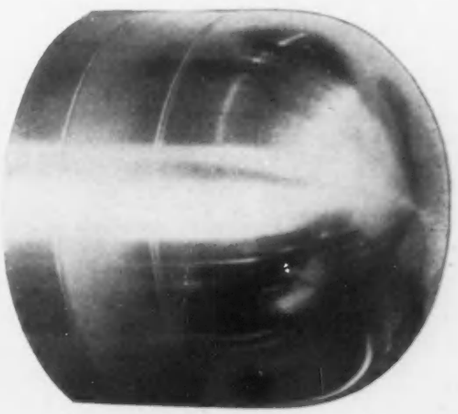


Milling Cutter
(With inserted blade)
Previous method, 12-13 hours.
Present method, 6 hours.



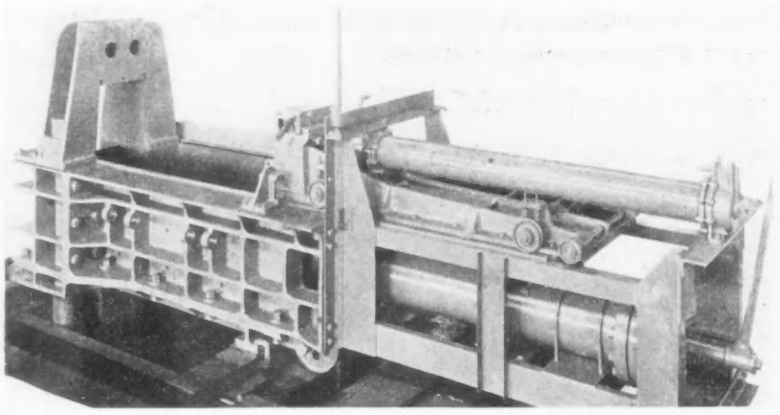
Drawing Punch Mating Die Spinning Chuck
Previous method (all three pieces), 15 hours.
Present method (all three pieces), 2 hours and 50 minutes.





Spinning Chuck
Previous method, 25-30 hours.
Present method, 4½ hours.

Piercing Punch
Previous method, 6-8 hours.
Present method, 2 hours.



Triple-Compression Press for Baling Bulky Scrap

SCRAP metal baling presses employing the principle of triple compression, that is, the use of three sets of rams, are now being constructed and installed by Galland-Henning Mfg. Co., Milwaukee. In these machines, designated as the type TC compressors, box sizes range from 28 in. wide by 28 in. deep to 60 in. wide by 45 in. deep, and capacities from 5 to 10 tons per hr. Finished bales measure 20 in. by 15 in. by approximately 15 in. and weigh from 350 to 500 lb.

These presses were designed primarily for scrap yard operators and for use on bulky scrap such as automobile fenders, body parts, discarded steel furniture, drums, barrels and new, large fluffy clippings; in fact, for baling those grades of scrap that in many parts of the country go to the city dump, but which should be salvaged. For baling small, compact clippings only the second and third compressions are used.

The first compression is from the side. The second compression is in the longitudinal direction and the third compression is from below by means of a vertical ram which also ejects the bale from the machine. The final compression, being made between solid walls at the high pressure end of the press box, assures a compact bale, free from fins and loose pieces. The first compression, being from the side, permits the press to be built with an extra large baling chamber for bulky scrap.

Construction is entirely of heavily ribbed annealed steel castings, accurately machined and bolted together. All joints are tongued and grooved to assure permanent alinement and prevent distortion. The press box is lined with conveniently renewable high-carbon steel plates. Cylinders and rams are steel forgings and the cylinder glands are cast steel, bronze bushed, arranged for flax packing. The cover is a one-piece steel casting, mounted on spring suspended rollers, and is operated by a double-acting air cylinder. The locking device employs an eccentric roller principle, thus affording rotating movement for release of cover, which prevents sticking.

All parts of the press are accessible for quick adjustment and repair. Operating control is by means of an air-powered poppet type valve. Power is generated by a hydraulic pump designed to give smooth and rapid operation. One of these new presses is now being installed at the Chicago Metal Corporation's plant.

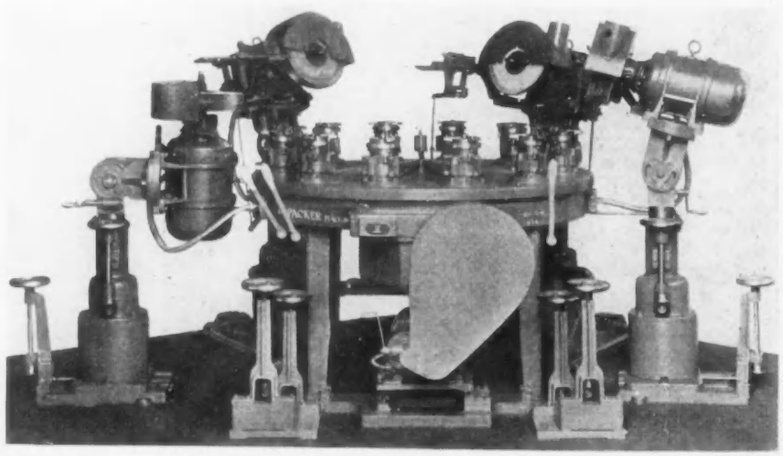
Automatic Polisher With Four or Five Wheels

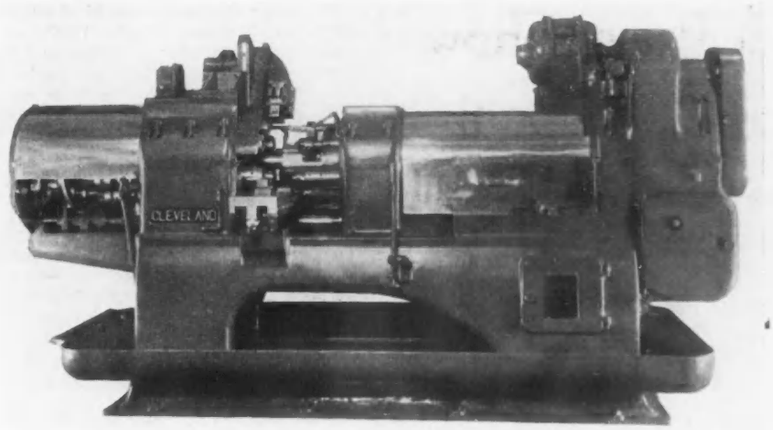
THE Packer Machine Co., Meriden, Conn., formerly the C. I. Packer Tool & Die Co., has added to its line of automatic polishing and buffing equipment the larger size unit shown in the accompanying illustration. This machine can be furnished with four or five wheel-heads, each individually driven either by 3, 5 or 7½-hp. totally-inclosed ball-bearing motors. The indexing work table has 12 spindles, each of which will take pieces up to 12 in. in diameter.

Universal wheel adjustment permits setting the wheel to any position between horizontal and vertical, and also swiveling of the wheel to any position required. Each wheel-head pedestal is adjustable longitudinally on its base by means of a handwheel and screw, arranged as shown in the illustration. Each of the 12 work-table spindles is equipped with an automatic expanding chuck, to the jaws of which may be fitted adaptors or fixtures for holding the work.

The work table, driven by a separate four-speed motor mounted in the base of the machine, rotates intermittently, and the dwell or length of time that the work is in contact with the wheels may be adjusted to suit the nature of the work and the finish required. Ample time is allowed in the operating cycle for loading and unloading the work. The table mechanism is driven by gears that are entirely submerged in a reservoir of oil.

Electrical controls comprise switches for each motor and a push button for emergency starting and stopping. The machine has all controls centralized at the front, so that only one operator is necessary. Mechanical composition feeding devices, controlled by levers at the front of the machine, are supplied, and exhaust hoods are provided over the wheels. The machine is completely wired, and to install it, only one connection is required.





Automatic Bar Machine with Facilities for Increased Production

THE Cleveland Automatic Machine Co., Cleveland, has brought out a new six-spindle Model M automatic bar machine, designed to increase the number of simultaneous multiple operations and the speed of production. In general design, this machine is similar to the company's four-spindle model.

One of the important features of the new machine is that it has an auxiliary turret with independent control of accelerated tool spindles which may be operated as stationary or revolving spindles. In addition to having two independent main cross-slides for front and rear tool positions, it is so designed that it may be furnished with as extra attachments two double top slides independently controlled, which are mounted on the work slide turret cap. One of these slides works in conjunction with the upper rear and top stations and the other with the upper front and top stations, providing six tool positions for forming, shaving and other operations. With the double top slides, the main tool turret and the auxiliary turret the machine has 18 tool positions.

Alloy Iron Castings Used

Rigid construction is provided throughout. Turret housings for the spindle and tool turrets are cast integral with the main bed castings to assure rigidity and permanence of alinement. The casting is nickel alloy. The power clutch is in the main drive head, which is mounted at the right-hand end of the machine with the control lever conveniently located.

Spindle change gears, which provide a wide range of speeds, are mounted on the outside of the drive head to permit rapid change. When in place they are covered by a swinging guard. Gears are made of forged alloy steel, have helical cut teeth and are hardened. The work spindle turret is a one-piece nickel alloy casting machined all over and ground to size. Spindles are of alloy steel forgings machined and ground and supported in wide adjustable bearings. Anti-friction bearings can be furnished. End thrust is carried on ball thrust bearings seated against the rear spindle sleeve. Force feed lubrication regulated at the source delivers oil to each bearing.

The main tool turret, cylindrical in form, is supported in the wide bearings of the turret housing and is arranged for six tool positions. It is actuated by cams on the operating drum acting directly on the cam roll inserted in the periphery of the tool providing direct action against the thrust of the cutting tools.

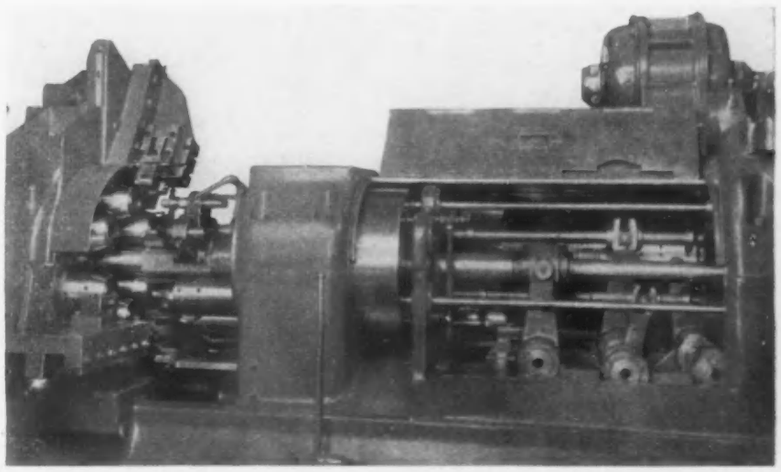
The auxiliary turret, hexagonal in form, is inserted in the center of the main tool turret and supported on a hardened and ground steel sleeve, which passes through the axis of the tool turret and into the work spindle turret, forming six extra independent tool positions for end working tools. Tee slots cut lengthwise in the six stations provide longitudinal adjustment and positive alinement for the work spindles.

Accelerated Spindles Independent of Tool Feed

Threading and reaming spindles are accelerated and operate independently of the tool feed, being controlled by individual levers fulcrumed from the master bracket, bolted to the bed of the machine and actuated by cams on the operating drum. Additional live spindles may be installed in the tool turret and operated from the same bracket by additional levers. A positive trip is provided for the threading spindle, controlled by the threading spindle itself to assure positive action when tapping close to the bottom of a hole.

Feed change gears are of helical type, hardened, and are arranged in geometrical progression to cover a wide range of tool feeds, eliminating the need of special camming. The feed bracket is equipped with anti-friction bearings. A safety pin in the worm wheel serves as a driver between this wheel and the camshaft. This shears in case of an overload at any point. The gage stop swings into position to gage work to length and is independent of tool movements and consequently does not interfere with tool positions. Large chip space is provided, and chips may be removed either from the rear or from underneath the spindle head.

The machine is available in four sizes, from ⅞ in. to 2 in., and is also being built as a chucking machine in two sizes, 4¾ in. and 6½ in.



Use of an auxiliary turret with independent control of accelerated tool spindles is a feature. The set-up shown is for producing bushings, the operations being boring, reaming, forming, shaving, and trepanning a groove 1/16-in. wide by ¼-in. deep.

Continental Steel Prices Show Further Evidences of Strength

British Tin Plate Trade Active, With Canada Buying— Russia to Purchase Large Quantity of Steel

LONDON, ENGLAND, Nov. 7 (*By Cable*).—Pig iron inquiry is improving. United Kingdom and Indian producers have mutually agreed on the regulation of Indian pig iron imports into Great Britain. Steel business is quiet and export sales are still difficult. China is inquiring for plates and Japan has bought about 2000 tons of thin black sheets.

Tin plate is firm on steady general business and mills are not pressing for sales. Canada is buying in good volume and the Continent, South America, Australia, are in the market.

Overseas demand for Continental iron steel is being maintained and producers are obtaining higher prices.

Dorman Long & Co. will manufacture under German license special steel sections hitherto made exclusively by Krupps. The Usines Gustave Boel is reported to have joined Belgian steel cartel and the Continent reports that United Kingdom makers may join international raw steel cartel by the end of the year.

The Soviet expects to order 600,000 tons of rolled steel during 1933. Russian output of pig iron in September was 642,000 tons, making a total for the nine months of 4,500,000 tons.

The Broken Hill Proprietary Co., Ltd., Australia, will erect a steel tube and pipe plant at Newcastle, New South Wales.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hearth	£4 17s. 6d.	to £5 7s. 6d.	
Black sheets, Japanese specifications	£10 15s.		
Tin plate, per base box	16s.	to 16s. 3d.	
Steel bars, open-hearth	£7 17½s.	to £8 7½s.	
Beams, open-hrth.	£7 7½s.	to £7 17½s.	
Channels, open-hearth	£7 12½s.	to £8 2½s.	
Angles, open-hearth	£7 7½s.	to £7 17½s.	
Black sheets, No. 24 gage	£8 5s.		
Galvanized sheets, No. 24 gage	£10 15s.		

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£2 3s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s.		
Steel bars, merchant	£3	to £3 2s. 6d.	
Beams, Thomas	£2 9s.	to £2 10s.	
Angles, Thomas, 4-in. and larger	£2 16s.		
Angles, small	£2 17s.		
Hoops and strip steel over 6-in. base	£3 5s.	to £3 7s. 6d.	
Wire plain, No. 8	£5 7s. 6d.		
Wire nails	£5 10s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

Shop and Economic Topics for Engineers Meeting

Cutting of metals, problems of the foundry and the steel plant, management and economic topics and an imposing collection of papers on design matters loom prominent in the program of the annual meeting of the American Society of Mechanical Engineers, to be held in New York, Dec. 5 to 9. Among the papers are the following:

What can be accomplished with modern machine tools and cemented-carbide cutting tools, by A. A. Merry. Grinding cemented tungsten and tantalum carbide tipped tools, by J. M. Highducheck. Progress report of the committee on cutting of metals, by Prof. O. W. Boston, University of Michigan, Ann Arbor, and C. J. Oxford, factory superintendent, National Twist Drill & Tool Co., Detroit. Effect of lathe cutting conditions on the hardness of carbon and alloy steels, by T. G. Digges.

Special steel for castings, by Major R. A. Bull, Electric Steel Founders' Research Group, Chicago. Malleable iron as a component part of machines and structures, by Prof. Enrique Touceda, Albany, N. Y. Progress report of the machine shop practice committee.

Use of blast-furnace gas in soaking pits, by G. T. Hollett. Reradiation from furnace walls, by J. D. Kel'er and H. C. Hottel. Rolling and extrusion of aluminum and its alloys, by Robert L. Streeter, vice-president, United States Aluminum Co., Pittsburgh. Carburizing with butane gas, by C. W. Spicer, vice-president, Spicer Mfg. Corpn., Toledo, Ohio. Progress report of the iron and steel division.

Morgoil roll-neck bearing, by F. P. Dahlstrom. Strength of roll necks, by Prof. W. Trinks and J. H. Hitchcock, Carnegie Institute of Technology. Lubrication of vertical journal bearings, by A. I. Ponomareff, and E. D. Howe. Chemistry of lubrication, by W. F. Parish, consulting lubrication engineer, New York, and Leon Cammen, New York.

Economic characteristics of the manufacturing industries, by Prof. Walter Rautenstrauch, Columbia University. The dissolving of concentrated industries, by Harold V. Coes, Ford, Bacon & Davis, New York. Management essentials for recovery, by C. M. Bigelow, president, Bigelow, Kent, Willard & Co., Boston. Ten years' progress in management, by Leon P. Alford, Ronald Press Co., New York.

Engineer's interest in foreman training, by Edward S. Cowdrick. Fundamentals of training, by G. Guy Via, supervisor of training, Newport News Shipbuilding & Dry Dock Co. Adult technical education, by O. W. Eshbach.

Theories of strength, by Dr. A. Nadai, research laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh. Working stresses for columns and thin-walled structures, by Prof. Stephen Timoshenko, University of Michigan, Ann Arbor. Stress concentration phenomena in fatigue of metals, by R. E. Peterson, Westinghouse Electric & Mfg. Co., East Pittsburgh. Fatigue of metals, by Prof. H. F. Moore, University of Illinois, Urbana. Application of creep tests, by Prof. G. H. MacCullough, Worcester Polytechnic Institute. Working stresses for high temperature service, by Percy G. McVetty, Westinghouse Electric & Mfg. Co., East Pittsburgh. Metals at high temperatures, by Ernest L. Robinson, turbine engineering department, General Electric Co., Schenectady, N. Y.

Notched bar tests, by Max Moser. Working stresses under impact, by N. N. Davidenkoff. Choice of working stresses, by C. R. Soderberg, Westinghouse Electric & Mfg. Co., East Pittsburgh. Active coils in helical springs, by Robert F. Vogt, Allis-Chalmers Mfg. Co., West Allis, Wis.

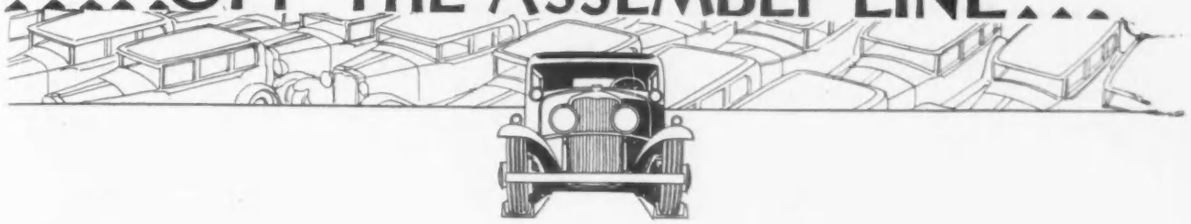
Car construction of the future, by C. E. Barba, mechanical engineer, Boston & Maine Railroad, North Billerica, Mass.

A Correction

E. Leon of the Amerlux Steel Products Corpn., 420 Lexington Avenue, New York, states that he was misquoted in a Washington report of the hearing before Acting Commissioner of Customs Frank Dow in the matter of alleged dumping of foreign steel, published in THE IRON AGE of Nov. 3, p. 696. Mr. Leon was quoted as saying that f.o.b. prices in Belgium and Luxemburg for home consumption are greater than f.o.b. prices on steel exported to the United States. Mr. Leon says, "What I did say was that the prices at which we were selling steel for export to the United States were higher than prices obtainable in the home market of the Belgo-Luxembourg Customs Union."

Declining 49.5 per cent, the value of electrical machinery, apparatus and supplies produced in 1931 was $969,825,713 against $1,918,733,253 in 1929, according to the Bureau of the Census.

...OFF THE ASSEMBLY LINE...



Motor Car Production Swings Upward; Plymouth Building 1000 Cars a Day

DETROIT, Nov. 7.

AUTOMOBILE production took another swing upward the past week largely because of the sharp rise in the output of the Plymouth Motor Corpn. From the standpoint of steel consumption, there has also been greater activity on the part of the Chevrolet and Buick companies, both of which are releasing fairly good tonnages for prompt delivery. It is believed that whatever support steel gets from the automotive industry in the next 30 days will come principally from the Plymouth and Dodge divisions of the Chrysler Corpn. and from Chevrolet and Buick.

Plymouth will make 20,000 cars this month.

* * *

Ford led the industry in sales in the four months ended Sept. 30, with 150,831 passenger cars and 25,632 commercial cars and trucks.

* * *

Dodge will have an all-helical gear transmission in its new car.

Details of New Plymouth

Plymouth was given a running start on its 1933 campaign last Tuesday when it held the first radio business conference and Mr. Chrysler and other officials broadcast information about the new car to dealers throughout the country. The 1933 Plymouth will be lower by $60 than the previous model, with the standard coupe priced at $495, as against $490 for the Chevrolet and Ford V-eight, $440 for the model B Ford and $470 for the Essex Terraplane. It has free flowing lines, with a more pronounced slant to the radiator and a rear end with sweeping curves which conceal the gasoline tank. The radiator shell and grille are chromium-plated. Bodies are roomier, but the wheelbase shorter. Floating power, free wheeling and a six-cylinder engine with an S. A. E. horsepower rating of 23.44 are among the mechanical features. The shipping weight of the four-door sedan is said to be 2553 lb.

Plymouth has already increased its production from 200 to 1000 cars a day, five days a week, and its November schedule calls for an output of more than 20,000 cars. Many Plymouth parts, including some bodies and all of the transmission and cylinder blocks, are being made at the Dodge main plant. Briggs Mfg. Co. still is building a liberal percentage of Plymouth bodies, but some of the body stampings formerly produced by Briggs are being turned out at the Dodge factory and shipped for assembly to the Briggs plant. Briggs, on the other hand, is furnishing the Dodge body factory with certain stampings for Plymouth bodies. Aside from the manufacture of Dodge cars, the Dodge plant is now prepared to make a considerable proportion of the parts used by all Chrysler divisions. For instance, it is tooled up for production of all the transmissions for Plymouth, De Soto, Dodge and Chrysler. This will mean relatively steady work in all departments of a plant which in the past few years has had little to do in many divisions. Moreover, it will result in lower manufacturing costs for all Chrysler companies, thus putting the Chrysler organization in a strong position to compete for business at relatively low retail prices in 1933.

The sudden acceleration of Plymouth production has had a stimulating effect on outside suppliers, such as Briggs, Motor Products, Midland Products (which make all the frames) and several foundries which cast engine parts. It is expected that Plymouth's high rate of activity will continue the remainder of the year. In the first nine months of 1932 Plymouth sold 91,086 cars, a remarkable showing when it is considered that it first made its bid for recognition in the low-price field as late as July, 1931.

Dodge Producing New Line

Dodge will get under way this week on the production of its new line, which will have many radical departures. It will have what Dodge engineers choose to term an "air-flowing" body, or stream lining reducing wind resistance 20 per cent. It will be equipped with individually sprung wheels which not only dispense with many conventional chassis details, but also open the door to manufacturing economies to be reflected in a record-breaking low price. It likewise is understood that the new Dodge will be the first car to have so-called "doughnut" tires as standard equipment. Perhaps the outstanding feature will be a new transmission of foreign origin which has all-helical gears and which operates silently at all speeds, including low and reverse gears. Other features of the 1932 cars, such as floating power and free wheeling, will be retained in the new models.

Chevrolet's Program Unaltered

Chevrolet's program of 110,000 cars in the next 90 days is going ahead without alteration. This ambitious schedule is attributed to the lack of stocks in dealers' hands, the confidence of Chevrolet's management that business is slowly but surely on the upgrade, and the desire to give steady employment to workers during the winter. It will be recalled that Chevrolet gave uninterrupted employment to its regular force all of last winter. Public announcement of Chevrolet's new models is expected some time next month. Buick is expanding its operations, but display of its new line is not scheduled until about Dec. 1, or later than the trade had anticipated. Studebaker is expected to reveal its new cars at approximately the same time. Its low-priced Rockne line will be continued with only slight refinements. Willys-Overland is now planning on starting operations late this

month. Oldsmobile is still tooling up and probably will not begin assemblies until early in December.

Ford continues to operate its Rouge plant three days a week, turning out about 1200 units a day. For the four-month period ended Sept. 30, Ford sold 150,831 passenger cars, compared with 107,788 for Chevrolet, while its commercial car and truck sales totaled 25,632 units, as against 20,120 for Chevrolet. Its total sales of all units in September amounted to 33.5 per cent of the industry's total. For the year to date Ford sold 263,580 cars, despite the fact that it was virtually out of the market for five out of the nine months. Ford bought some full-finished sheets for certain parts for 7000 cars the past week.

Detroit Notes

After operating three open-hearths for four days last week, Great Lakes Steel Corpn. has taken off one furnace and again is running two out of six . . . Diamond-T Motor Car Co. has placed an order for 1650 truck frames with a Milwaukee fabricator. . . . New Process Gear Co. at Syracuse, N. Y., will produce a large number of gears and axles for an automobile maker. . . . Clayton & Lambert, Detroit, is making the all-metal tire cover for the new Plymouth.

Coke Production Gains

By-product coke production in September, at 1,544,491 tons, reflected an increase of 8.3 per cent in the average daily output over that for August when production totaled 1,473,904 tons. Beehive coke production also registered a gain in September when the total output of 45,700 tons showed a 16.7 per cent increase in the average daily rate over that for August. By-product coke production in the first nine months of this year, at 15,890,531 tons, was 37.8 per cent less than the total of 25,555,268 tons in the corresponding period last year, while beehive coke output of 527,900 tons in the same period of 1932 was 46.6 per cent under the aggregate of 988,200 tons in the first nine months of 1931.

Youngstown Sheet & Tube Co., Youngstown, has disposed of the buildings, machinery and other equipment of its subsidiary, Mayville Iron Co., Mayville, Wis., to the Iron & Steel Products Co., Chicago, which will begin work immediately on dismantling the plant. The Mayville blast furnace was built in 1860 and operated continuously nearly 70 years, having been shut down in 1929.

The thirty-sixth annual meeting of the National Founders Association will be held on Wednesday and Thursday, Nov. 16 and 17, at the Waldorf-Astoria Hotel, New York.

Steel Ingot Production Gained 9.6 Per Cent in October

Industry Operated at an Average of 19 Per Cent of Capacity Compared With 17.34 Per Cent in September

STEEL ingot production in the United States in October, as officially computed by the American Iron and Steel Institute, totaled 1,068,550 gross tons, compared with 975,061 tons in September. Both months had 26 working days and the daily average for October was 41,098 tons, against 37,502 tons in the preceding month. The gain in output over that of September was 9.6 per cent. This compares with a gain of 21.6 per cent in September over August, which showed the lowest production of the year. The October increase brought production to the highest level since May, when the daily average was 42,540 tons.

The average rate of production in October, according to the institute's figures, was 19 per cent, compared with 17.34 per cent in September and 14.26 per cent in August.

Both open-hearth and Bessemer ingot output gained in October. The open-hearth output was 885,773 tons, compared with 804,556 tons in September, and the Bessemer production was 132,876 tons, against 124,970 tons in the previous month.

For the ten months of the year the calculated total production is 11,236,315 tons, compared with 22,299,860 tons in the corresponding period in 1931.

"The Manufacture of Sheet Steel and Tin Plate," a one-reel motion picture film prepared under supervision of the United States Bureau of Mines, depicts operation of a continuous rolling mill; cutting and rolling of steel slabs; reheating of slabs; pickling of black plate; the annealing process; cold rolling of long sheets; white annealing and pickling. The scenes include rolling, heat treating, pickling, inspection and stamping of automobile sheets and various phases of galvanized sheet manufacture. Copies of the film may be obtained, without charge except for transportation costs, from the Pittsburgh Experiment Station of the United States Bureau of Mines, Pittsburgh.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported by Companies Which Made 95.33 Per Cent of 1931 Ingots

1931	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	2,098,175	296,620	2,512,140	93,042	27	43.80
February	2,131,079	296,974	2,547,027	106,126	24	49.96
March	2,565,531	346,137	3,054,339	117,475	26	55.30
April	2,321,043	316,668	2,766,959	106,421	26	50.09
May	2,130,805	301,639	2,551,633	98,140	26	46.20
June	1,782,007	246,365	2,127,762	81,837	26	38.52
Six Months	13,028,640	1,804,403	15,559,860	100,386	155	47.25
July	1,574,379	225,030	1,887,580	72,599	26	34.17
August	1,462,254	174,380	1,716,829	66,032	26	31.08
September	1,274,072	199,151	1,545,411	59,439	26	27.98
October	1,319,958	195,943	1,590,180	58,896	27	27.72
November	1,276,856	240,441	1,591,644	63,666	25	29.97
December	1,068,384	172,046	1,301,211	50,047	26	23.56
Total	21,004,543	3,011,394	25,192,715	81,006	311	38.13

These figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1930, of 66,069,570 gross tons for Bessemer and open-hearth steel ingots.

Reported for 1932 by Companies Which Made 95.33 Per Cent of 1931 Ingots

1932	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	1,230,661	160,633	1,459,450*	56,133*	26	25.96*
February	1,232,568	157,067	1,457,710*	58,308*	25	26.96*
March	1,149,307	193,944	1,409,054*	52,187*	27	24.13*
April	1,036,227	144,197	1,238,250*	47,625*	26	22.02*
May	950,785	103,593	1,106,030*	42,540*	26	19.67*
June	755,123	100,249	897,275	34,511	26	15.96
July	652,650	102,872	792,533	31,701	25	14.66
August	696,206*	97,323*	832,402	30,830	27	14.26
September	804,556	124,970	975,061	37,502	26	17.34
October	885,773	132,876	1,068,550	41,098	26	19.00
Total	9,393,856	1,317,724	11,236,315	43,217	260	19.98

*Revised.
The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1931, of 67,473,630 gross tons for Bessemer and open-hearth steel ingots.

...PERSONALS...

ERNST R. STANDFUSS, vice-president, Harnischfeger Corpn., Milwaukee, has returned from a tour around the world, largely to observe business conditions. He was absent seven months.

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DR. MARCUS A. GROSSMANN, research engineer of the Illinois Steel Co., and D. T. HADDOCK, consulting engineer, American Sheet & Tin Plate Co., will deliver addresses on stainless steel at a joint meeting of the Engineers Club of Cincinnati, the Cincinnati Chapter of the American Institute of Architects and the Cincinnati Chapter of the American Society for Steel Treating, in Cincinnati this evening (Nov. 10). Mr. Grossmann's subject is "Development of Stainless Steels and the Present State of the Art," while Mr. Haddock's subject is "Stainless Steel—Available Types, Uses and Applications."

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STEWART J. CORT, general manager of the Sparrows Point plant of the Bethlehem Steel Co. has become a member of the "Share-the-Work" committee for the Baltimore district.

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A. C. OLFS, formerly Detroit representative for the Stewart Die Casting Co., has been made Detroit manager in charge of sales by the Stewart-Warner Corpn., DONALD LACHANCE, who has been connected with the Stewart Die Casting Co. in the Chicago territory, has been placed in charge of sales in Michigan for the Stewart die casting division, succeeding Mr. Olfs.

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HARVEY H. WEBER has become superintendent of the Burnside Steel Foundry Co., Chicago.

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THOMAS E. HOWLAND, of Pond Hill, Naugatuck, Conn., has been appointed Connecticut representative of David H. Smith & Sons, Inc., Brooklyn, N. Y.

EUGENE H. HEALD

who has been made vice-president and general contracting manager for the American Bridge Co., as announced in these columns last week.

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A. L. FREEDLANDER, vice-president and factory manager of the Dayton Rubber Mfg. Co., Dayton, was scheduled to ride on the Graf Zeppelin from South America to Germany on a business trip on Oct. 29.

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B. E. HUTCHINSON, vice-president and treasurer Chrysler Corpn. and chairman of the board Plymouth Motor Corpn., Detroit, will lecture on "The Automobile Industry" on Dec. 13 at Princeton University. His address will be the first of the Cyrus Fogg Brackett lecture series, 1932-3.

Rehabilitation Drive Launched in Bridgeport

The national Share-the-Work and Industrial Rehabilitation committees of the Bridgeport, Conn., district have consolidated to conduct a joint buying campaign. This is described by Col. H. S. Horner, vice-president Bullard Co., and organizer of the Bridgeport rehabilitation group, as "a strictly buying, not a selling movement." Bridgeport, according to officers of the district rehabilitation group, is the first New England city to organize for such a drive.

In addition to Colonel Horner, the joint committee includes: W. G. Carey, Jr., vice-president Yale & Towne Mfg. Co.; G. S. Hawley, president Bridgeport Gas Light Co.; R. M. Eames, manager Bryant Electric Co.; and H. A. Chaffee, vice-president A. W. Burritt Co.

National Founders' Program Arranged

The National Founders' Association has arranged the program for its annual meeting to be held at the Waldorf-Astoria, New York, on Nov. 16 and 17. Among those who will address the convention are Dr. Gerald Wendt, New York; James A. Emery, Washington, on "The New Deal"; Dr. Lionel D. Edie, New York, on "Business Prospects and Business Hurdles"; Dr. F. Spencer Baldwin, director of research, National Industrial Conference Board, on "Unemployment Problems"; Whiting Williams, Cleveland, whose subject will be "The Worker Carries On"; and Dr. Carey P. McCord, medical director, Industrial Health Conservancy Laboratories, Cincinnati, on "Silicosis in the Foundry."

Bethlehem Consolidates Sales Departments

Consolidation of structural and plate and general sales forces of Bethlehem Steel Co. has been effected. Under the new arrangement, E. E. Goodwillie becomes special representative of Bethlehem Steel Co. in the sales organization, his former office as general manager of structural and plate sales being discontinued. C. W. Bretland is appointed assistant manager of sales in the New York district offices, and his former position as district manager of structural and plate sales is discontinued. V. A. Jevon, formerly manager of structural and plate sales at Chicago, has been appointed assistant manager of sales in the Baltimore district.

New York Central Gets "Work" Loan

WASHINGTON, Nov. 7.—Repair to 10,000 steel box and 3000 automobile cars will be made by the New York Central Railroad at its shops in East Buffalo, N. Y., and Indianapolis. The road has been granted a loan of $2,500,000 by the Reconstruction Finance Corporation for this purpose. If, during the process of making these repairs, traffic conditions warrant, the company will receive the privilege of altering its plan in order to repair hopper cars, stock cars and locomotives. Hopper cars would be repaired in the company's shops at Avis, Pa., stock cars at Toledo, Ohio, and locomotives at West Albany, N. Y., Cleveland and Indianapolis. Repairs for the steel box cars will consist chiefly of new floors, linings, running gear and painting. For the automobile cars repairs will consist of draft gears and new roofs.

The railroad has requested that money be advanced at the approximate monthly rate of $350,000 over a three-year period. The average cost of repairing the box cars will be $150, while the average cost of repairing the automobile cars is estimated at $300-plus.

Alabama Pipe Co., Anniston, Ala., is installing a new process for the manufacture of cast iron culvert pipe at its ornamental foundry.

Follansbee Brothers Co. Buys Steckel Mill

Sale of a 38-in. cold-rolling mill of the Steckel type to the Follansbee Brothers Co., Pittsburgh, has been confirmed by the Cold Metal Process Co., Youngstown. The mill will be installed at the Follansbee, W. Va., plant of the former company, and will be used for the production of tin plate. The mill will be installed in the open-hearth building at Follansbee, and dismantling of the four open-hearth furnaces at that point will allow space for further installations of Steckel mills. The company has been licensed by the Cold Metal Process Co. to produce strip steel for tinning, and contemplates a future installation of as many as 10 cold mills and one hot mill. The unit recently ordered will be produced by the Baldwin-Southwark Co., Philadelphia, a subsidiary of the Baldwin Locomotive Works, and will be delivered in about 12 weeks.

The Cold Metal Process Co. has also announced that a third Steckel cold-rolling unit has been sold to the Weirton Steel Co., Weirton, W. Va. This will supplement a 38-in. unit which has been in production for more than a year, and a 26-in. unit which was ordered about two months ago. All of these mills will be used for the manufacture of tin plate.

The American Rolling Mill Co. has also purchased a 20-in. Steckel cold-rolling mill for installation at Butler, Pa. This mill has been shipped and is already in production on strip steel. Besides the mills mentioned above, the Cold Metal company has in the past installed five Steckel units at the Brackenridge, Pa., plant of the Allegheny Steel Co., ranging in capacity from 7½ in. to 26 in.

To Exploit Patented Products Internationally

Amerika-Interessen, Inc., Chrysler Building, New York, which has been established as American unit of A. G. Fuer Amerika-Interessen, operating in Berlin, Paris and London, will offer a service for negotiating agreements covering production and marketing rights for devices, processes and patents that have proved successful, making them available to manufacturers in various countries which have been unable to participate in foreign markets. The new company proposes to accomplish such agreements by issuing licenses on a royalty basis or by outright sale of manufacturing and marketing rights for the country involved. In addition, the organization will negotiate reciprocal arrangements abroad for American patents.

The service is conceived, according to B. Lilienthal, president of the corporation, to replace to some extent the export of manufactures by an international exchange of inventive achievements, engineering skill and manufacturing experience. Engineers of the company have already selected about 100 devices, including machine tools and appliances, air-conditioning equipment, welding processes and steel house construction, which are deemed suitable for immediate exploitation in the United States.

Foundrymen to Meet in Chicago Next Year

The 1933 convention and exposition of the American Foundrymen's Association will be held at the Stevens Hotel, Chicago, the week of June 19. The board of directors unanimously agreed that Chicago is the logical place because of the Century of Progress exposition next year in Chicago and also because the annual convention of the American Society for Testing Materials is scheduled for the same place the following week, that of June 26.

Carload of Tin Plate Costs $1200 in Wages

The effect of foreign competition on American industry was recently discussed by John C. Williams, vice-president, National Steel Corpn. and president of its subsidiary, Weirton Steel Co., at a meeting at Weirton, W. Va.

The loss of a single carload of tinplate to a foreign producer means a loss of $1,200 in wages to steel workers alone, with other losses to miners, farmers, cotton growers, lumbermen, railroaders and others would have received income from the 350 tons of materials entering into the manufacture of a carload, or 50 tons, of tin plate, he stated.

"Consider what it takes to make a carload of tin plate with a net weight of 50 tons," Mr. Williams said.

"It takes 55.8 gross tons of sheet bar, 65.6 gross tons of ingots, 42.27 gross tons of pig iron, 42.27 net tons of coke, 85 gross tons of iron ore, 27 gross tons of limestone, 30 gross tons of scrap, 160 net tons of coal, 2.5 net tons of sulphuric acid, 1000 lb. of middlings and low grade flour, $4 worth of cotton cloth in disks, 2500 ft. of lumber and 66 gal. of lubricating oil," he continued.

"All of this totals 350 tons of materials to make 50 tons or one carload of tin plate. There is $1,200 in wages paid out in Weirton alone for the manufacture of this tin plate. Think of all the other wages paid to miners, farmers, cotton growers, lumber men, railroaders and others who are given employment in the collection, manufacture and transportation of these raw materials."

Steel Barrel Output Higher in September

WASHINGTON, Nov. 4.—The output of steel barrels in September rose to 395,640, representing 28.4 per cent of the capacity of the 26 establishments reporting to the Bureau of the Census, against 362,993, or 26 per cent of capacity, in August. Shipments increased to 395,241 from 360,509 and stocks at the end of September declined to 32,333 from 34,934 at the end of August.

Unfilled orders for delivery within 30 days showed a slight decline to 158,412, against 159,526. Unfilled orders for delivery beyond 30 days also dropped slightly to 454,961 from 457,639.

Production in the first nine months of 1932 totaled 3,824,085, compared with 4,659,390 in the corresponding period of last year.

Power from the Atmosphere

A motor, which is said to draw its power from the surrounding atmosphere, is to be shown at the Power Show in New York, in the week of Dec. 5-9, by the Cochrane Corpn., Philadelphia. It is a thermodynamic device operating continuously on a temperature head which is generally available and which is comparable to that realized in Claude's sea-water thermal power plant experimented with near Santiago, Cuba.

"The present device is not put forward," says the company, "as a rival of steam turbines, oil engines or water wheels, and no stock is offered for sale. Rather the exhibit is designed to direct thought to the fact that there are unsuspected scientific possibilities lying all about and awaiting only study by alert inventors and development by progressive industrialists; in other words, there is still unlimited opportunity for change and improvement in the world of engineering." The Cochrane Corpn. will also exhibit a new pilot-operated regulating valve designed for the accurate control of fluid flow under high pressures.

▲▲ OBITUARY ▲▲

WILLIAM LAIDLAW, president and manager of William Laidlaw, Inc., maker of metal cutting machinery, Belmont, N. Y., died suddenly at his home in that city on Oct. 23, aged 52 years.

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WALTER L. KEITH, founder and for 40 years the active head of the Cleveland Block Co., Cleveland, manufacturer of steel and iron tackle blocks, died Oct. 22.

• • EDITORIAL COMMENT • •

Aesop re Rehabilitation

A CERTAIN knight in time of war took great pains to keep his horse well fed and cared for and in first rate condition. When the war was over the knight's pay was reduced, and he allowed his horse, that had carried him nobly through many a hot engagement, to be poorly fed and badly treated until the animal's strength and spirit fell away.

It was not long before the war was renewed and the knight tried to make his horse into a battle steed once more. There was not time for this, however, and the horse, as his weak legs gave way under him in a charge, said to his master, "It is too late now to repair your neglect. It is not my fault that I can no longer bear you as before."

Aesop's tale has a practical application to industry today. Instead of being nourished with new equipment, many plants which have served their owners well are being starved through neglect. Their machinery is obsolete and poorly adapted to successful competition when business expands. Too late the management will discover that its plant cannot carry it through a period of severe competition with low production costs a prime factor in securing orders. The plant then might well say to its owner, as the horse did to the knight, "It is too late now to repair your neglect. It is not my fault that I can no longer carry you as before."

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Russian Steel Output Steady

PROSPERITY has not disappeared from the Russian steel industry, according to official data just recently released. The depression, which has severely cut down the pig iron and steel output of all other leading producing countries, has apparently not measurably affected the Russian pig iron or steel output, even up to July 1, this year. The data show that the pig iron output in 1931 was 411,800 tons per month as compared with 411,500 tons each month in 1930, with the rate to July 1, this year, at 489,500 tons monthly. In steel the 1931 output was 442,100 tons per month or a decline of only about 5 per cent from the 466,600 tons made in each month of 1930, while for the first half of this year the volume had risen to 478,000 tons per month. This is rather a remarkable showing. Expansion, with the aid and advice of American experts, has been one of the prominent Russian developments of the last five years. But even then, unless there were an active consumptive demand for iron and steel, the volume of output would not maintain its present rate. A reliable survey of actual conditions in Russia is not available. It is possible that imports of steel are less, necessitating larger domestic supplies.

Sales Eggs In Many Baskets

IN examining the sources from which his business came, a manufacturer of cutting tools discovered a few years ago that the bulk of it was from one industry which centered in his city. Although his sales were of ample proportions, he foresaw the danger in case anything should happen to that industry, and against the protests of his colleagues began to lessen the sales pressure in that direction and apply it instead in other industries. Within a short time only 40 per cent instead of 80 per cent of his business was originating in this one industry.

Today that manufacturer is congratulating himself that he had the courage in good times to prepare for bad times. The demand from his city's pet industry has shriveled to a mere shadow of its former self, but he is now able to reach out into other lines using cutting tools and gratefully scoop into his basket orders which several years ago seemed relatively unattractive.

This does not mean that today this manufacturer is "riding high." He has suffered severely from the depression, but not so acutely as his competitors, who in the better days contented themselves with serving one industry. While they sit and bemoan their state, he is gathering in small orders from Massachusetts to Texas. During the upturn he will feel the effects of improvement first, because of his foresight in carrying out a program of diversification.

Here is an example of the wisdom of spreading one's business over as many industries as economically feasible. We wonder how many companies will keep this in mind in the midst of the next era of prosperity.

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X-Ray Inspection For Railroad Equipment

THE Mechanical Division of the American Railway Association has adopted the extensive use of X-ray equipment to inspect materials entering into the construction of railroad equipment, according to a recent report. This development is of particular interest to those fabricating such equipment by welding, as it means that important parts guarding the safety of passengers may now be welded and then individually X-ray examined to make doubly sure that not only the weld but the material itself is sound.

For less important parts the X-ray may be used to check practice not only in welding but in casting and forging. As in the case of building construction, some railroad engineers have been slow to give full recognition to fabrication by welding. It is encouraging to find that through the use of the X-ray this important branch of the metal-working industry may come into its own.

Revised Pig Iron Production Figures for October

PRELIMINARY figures of pig iron production in October, published on page 702 of the Nov. 3 issue of THE IRON AGE, were substantially correct, as verified by complete returns from all active furnaces since that issue went to press. The revised figures show a difference in the month's total of only 21 tons.

As revised, the October total was 644,808 gross tons, compared with 592,589 tons in September. The October daily rate, at 20,800 tons, showed a gain of 5.3 per cent from the September figure of 19,753 tons.

Furnaces in operation on Nov. 1 totaled 49, making iron at the rate of 20,170 tons daily, against 47 on Oct. 1, with a daily operating rate of 19,205 tons.

The Jones & Laughlin Steel Corpn. has begun work dismantling its Soho furnace, which reduces the total number of available furnaces in the country to 283.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) October (31 Days)	Production (Gross Tons) September (30 Days)	Nov. 1 Number in Blast	Nov. 1 Operating Rate, Tons a Day	Oct. 1 Number in Blast	Oct. 1 Operating Rate, Tons a Day
New York:						
Buffalo	49,237	38,533	3	1,590	3	1,360
Other New York and Mass.	....	....	0	....	0	....
Pennsylvania:						
Lehigh Valley	22,911	18,226	2	740	2	610
Schuylkill Valley	....	....	0	....	0	....
Susquehanna and Lebanon Valleys	....	....	0	....	0	....
Ferromanganese	....	....	0	....	0	....
Pittsburgh District	113,733	108,397	8	3,240	9	3,740
Ferro. and Spiegel	2,302	2,212	1	75	1	75
Shenango Valley	21,048	14,331	1	285	2	810
Western Pa.	10,702	8,956	1	345	1	300
Ferro. and Spiegel	....	....	0	....	0	....
Maryland	26,077	35,743	2	840	2	1,190
Wheeling District	81,451	66,503	4	2,630	4	2,215
Ohio:						
Mahoning Valley	52,783	65,618	4	1,470	3	1,520
Central and Northern	77,541	71,036	6	2,500	6	2,370
Southern	18,299	8,758	2	710	1	290
Illinois and Indiana	106,688	105,193	8	3,440	8	3,200
Mich., Wis. and Minn.	....	7,710	0	....	0	....
Colo., Mo. and Utah	4,277	4,233	1	140	1	140
Virginia	....	....	0	....	0	....
Kentucky	9,178	10,316	1	295	1	345
Alabama	48,581	26,724	5	1,870	3	1,040
Ferromanganese	....	....	0	....	0	....
Tennessee	....	....	0	....	0	....
Total	644,808	592,589	49	20,170	47	19,205

Daily Average Production of Coke Pig Iron

Gross Tons

	1930	1931	1932
January	91,209	55,299	31,380
February	101,390	60,950	33,251
March	104,715	65,556	31,201
April	106,062	67,317	28,430
May	104,283	64,325	25,276
June	97,804	54,621	20,935
½ year	100,891	61,356	28,412
July	85,146	47,201	18,461
August	81,417	41,308	17,115
September	75,890	38,964	19,753
October	69,831	37,848	20,800
November	62,237	36,782	.....
December	53,732	31,625	.....
Year	86,025	50,069	.....

Merchant Iron Made, Daily Rate

1931	*Tons*	1931	*Tons*
January	9,416	December	6,778
February	11,332	1932	
March	11,481	January	6,256
April	13,439	February	7,251
May	13,212	March	7,157
June	11,209	April	5,287
July	12,012	May	4,658
August	9,569	June	6,090
September	8,985	July	3,329
October	7,051	August	3,070
November	5,758	September	3,213
		October	4,286

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron* 1931	Pig Iron* 1932	Ferromanganese† 1931	Ferromanganese† 1932
January	1,714,266	972,784	14,251	11,250
February	1,706,621	964,280	19,480	4,010
March	2,032,248	967,235	27,899	4,900
April	2,019,529	852,897	25,456	481
May	1,994,082	783,554	23,959	5,219
June	1,638,627	628,064	11,243	7,702
½ year	11,105,373	5,168,814	122,288	33,562
July	1,463,220	572,296	17,776	2,299
August	1,280,526	530,576	12,482	3,414
September	1,168,915	592,589	14,393	2,212
9 months	15,018,034	6,864,275	166,939	41,487
October	1,173,283	644,808	14,739	2,302
November	1,103,472	.....	14,705	.....
December	980,376	.....	15,732	.....
Year	18,275,165	.....	212,115	.....

*These totals do not include charcoal pig iron. The 1931 production of this iron was 46,213 gross tons.
†Included in pig iron figures.

Warren Tool & Forge Co. Reorganized

The Warren Tool Corpn., Warren, Ohio, has been formed as a reorganization of the Warren Tool & Forge Co. by the bondholders' committee of the latter company and will continue the forged steel hand tool business and malleable iron foundry which the old company has operated since 1912. It will also continue the manufacture of the old company's line of railroad track tools made from special alloy steels. New forging furnaces and additional heat treating equipment are being installed and other improvements will be made to the plant and equipment.

C. L. Schoonover will be president and general manager, Howard C. Mull, vice-president in charge of sales, R. E. Gibson, treasurer, and Thorn Pendleton, secretary. Mr. Schoonover has recently operated the business as agent for the bondholders' committee and for 15 years was general manager of the General Fire Extinguisher plant of the Grinnell Co. at Warren. Mr. Mull has been closely associated with the engineering, manufacturing and sales divisions of the railroad track tool business since 1912.

Speed in Oxygen Cutting of Steel

In THE IRON AGE of Sept. 15, page 405, was given a table of speeds of cutting different thicknesses of steel by means of the oxy-acetylene torch. The speeds as listed are five times the actual, for the reason that instead of being listed in terms of inches per minute, they should have been marked feet per hour. The table appeared in a review of a paper presented to the American Society of Mechanical Engineers by C. G. Bainbridge, of the British Oxygen Co., Ltd., London.

SUMMARY OF THE WEEK'S BUSINESS

Steel Industry Under Election Influence; Ingot Production Declines Slightly

Hesitancy of Buyers Marked in Closing Days of Campaign— Increase in Motor Car Production Points to Better Steel Demand

PRE-ELECTION hesitancy, which has exerted a dampening influence on iron and steel buying since the middle of October, reached its climax in the last week of the Presidential campaign. With most consumers marking time in the last few days of suspense, business volume suffered noticeably. While slight gains in steel production were registered at Cleveland and Buffalo, losses were reported at Birmingham, Detroit and in the Valleys, reducing the national average from 20 per cent to 19½ per cent of capacity.

Undoubtedly a recovery in buying will follow the release of election tension. The steps thus far taken by certain automobile builders to increase their operations are one earnest of such improvement. Whether the gain will be sufficient to offset seasonal tendencies as the year-end approaches is still uncertain. Much depends on the rapidity with which railroad rehabilitation programs get under way and structural projects, financed by public funds, are launched.

The upward impetus in automobile output has come chiefly from a sharp rise in Plymouth schedules. Production of this car has been increased from 200 to 1000 units a day, five days a week, and the November total will exceed 20,000. Meanwhile Chevrolet is going ahead with its recently announced program, which calls for the manufacture of 110,000 cars in the next 90 days. Greater activity on the part of both Chevrolet and Buick has been reflected in good-sized releases of steel for prompt delivery. Ford has bought full-finished sheets for certain parts for 7000 cars, and continues to operate its Rouge plant three days a week, turning out about 1200 units a day.

The confidence of motor car makers in the imminence of improvement in automobile buying is traceable partly to the large replacement requirements of the market. According to Detroit estimates, fully 8,000,000 of the 22,000,000 cars in service in this country are ready for the scrap heap.

FABRICATED steel awards for the week are very light, totaling only 4300 tons, but a number of large pending projects are approaching the contracting stage. For the Golden Gate bridge, San Francisco, for which 75,000 tons of structural material was recently placed, 10,700 tons of structural steel and 6000 tons of bars remain unawarded. The cables and suspenders for the bridge, amounting to 24,890 tons, have just been let to John A. Roebling's Sons Co. Bids on the structural material for a post office at Cleveland, 11,000 tons, will be taken Nov. 15.

Releases against old rail contracts, which last week enabled a Pittsburgh rail mill to resume operations, have now permitted a Chicago mill to start for a two weeks' run. The Western Maryland has purchased 1600 tons of rails and a number of larger tonnages may be placed before Jan. 1. The Chesapeake & Ohio, which had a large portion of its 1932 purchase of rails in stock, has authorized the laying of much of this tonnage and has released the remaining 50 per cent of the required track fastenings, orders for which had been held up at the mills.

The Norfolk & Western has placed 1300 tons of plates for the repair of 500 hopper cars at its Roanoke, Va., shops. The Reading has bought additional plates for car repairs and still has about 700 tons to award. The New York Central car repair program, for which a Reconstruction Finance Corporation loan was recently authorized, will call for a minimum of 10,000 tons of steel, according to estimates of the trade.

Tin plate production has declined to 45 per cent of capacity. Specifications have fallen off sharply pending the announcement of the 1933 price, which is expected in the next week or two.

Prices have shown little additional change, evidently reflecting the dullness of most markets. Scrap shows a softer tone, although actual reductions are limited mainly to the eastern Pennsylvania district. In that area also malleable pig iron is off $1.75 a ton and low phosphorus iron 50c. a ton. A central Pennsylvania melter has purchased 6000 tons of basic iron, and an eastern Pennsylvania furnace has gone into blast after a long period of inactivity. Generally speaking, foundry melt throughout the country is at an unchanged rate, although stove makers in the St. Louis district are busier and automotive foundries tributary to Chicago are taking more metal.

Los Angeles has divided an order for 7500 tons of centrifugal cast iron pipe between the United States Pipe & Foundry Co. and R. D. Wood & Co.

STEEL ingot production in October, at 1,068,550 tons, or 41,098 tons daily, showed a gain of 9.6 per cent over the September output of 975,061 tons, or 37,502 per day. This increase followed a gain of 21.6 per cent in September over August. October output was the highest since May and was one-third larger than the August total, which was the lowest of the entire depression.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Nov. 7, 1932	Nov. 1, 1932	Oct. 10, 1932	Nov. 10, 1931
Per Gross Ton:				
No. 2 fdy., Philadelphia	$13.59	$13.59	$13.84	$15.51
No. 2, Valley furnace	14.50	14.50	14.50	16.00
No. 2 Southern, Cin'ti	13.82	13.82	13.82	14.69
No. 2, Birmingham	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*	15.50	15.50	15.50	17.00
Basic, del'd eastern Pa.	13.50	13.50	13.50	16.25
Basic, Valley furnace	13.50	13.50	13.50	15.00
Valley Bessemer, del'd P'gh.	16.89	16.89	16.89	18.26
Malleable, Chicago*	15.50	15.50	15.50	17.00
Malleable, Valley	14.50	14.50	14.50	16.50
L. S. charcoal, Chicago	23.17	23.17	23.17	25.04
Ferromanganese, seab'd carlots	68.00	68.00	68.00	85.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$43.00	$43.00
Light rails at mill	30.00	30.00	32.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	29.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	29.00
Slabs, Pittsburgh	26.00	26.00	26.00	29.00
Forging billets, Pittsburgh	31.00	31.00	33.00	35.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh. lb.	1.60	1.60	1.60	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.93
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.898	1.898	1.898	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.85¼
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.10
Hot-rolled strips, Pittsburgh	1.45	1.45	1.45	1.50
Cold-rolled strips, Pittsburgh	2.00	2.00	1.90	2.05

Finished Steel

Per Lb. to Large Buyers:	Nov. 7, 1932 Cents	Nov. 1, 1932 Cents	Oct. 10, 1932 Cents	Nov. 10, 1931 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.10	2.10	2.20	2.40
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.20	2.20	2.30	2.50
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	3.00
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.55	1.70
Hot-rolled sheets, No. 10, Chicago dist. mill	1.65	1.65	1.65	1.80
Wire nails, Pittsburgh	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
P'ain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh	$4.75	$4.75	$4.75	$4.75

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	$9.25	$9.25	$9.75	$10.25
Heavy melting steel, Phila	7.25	7.25	7.25	8.00
Heavy melting steel, Ch'go	6.00	6.00	6.00	8.00
Carwheels, Chicago	7.00	7.00	7.00	9.00
Carwheels, Philadelphia	9.25	9.50	10.00	11.50
No. 1 cast, Pittsburgh	9.50	10.00	10.00	10.00
No. 1 cast, Philadelphia	9.25	9.50	9.50	10.50
No. 1 cast, Ch'go (net ton)	6.25	6.25	6.25	8.50
No. 1 RR. wrot., Phila	7.50	7.50	7.50	9.50
No. 1 RR. wrot., Ch'go (net)	4.50	4.50	4.50	6.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$1.75	$1.75	$1.75	$2.40
Foundry coke, prompt	2.75	2.75	2.75	3.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	5.25	5.25	6.25	7.37½
Electro'ytic copper, refinery	5.00	5.00	6.00	6.75
Tin (Straits), New York	**23.65**	23.35	23.95	23.65
Zinc, East St. Louis	3.00	3.00	3.05	3.25
Zinc, New York	3.37	3.37	3.42	3.60
Lead, St. Louis	**2.90**	2.87½	3.00	3.90
Lead, New York	3.00	3.00	3.15	4.05
Antimony (Asiatic), N. Y.	**5.87½**	5.50	5.62½	6.85

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Nov. 7, 1932	1.948c. a Lb.	$13.59 a Gross Ton	$7.50 a Gross Ton
One week ago	1.948c.	13.59	7.50
One month ago	1.977c.	13.64	7.67
One year ago	2.008c.	14.96	8.75
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Phi'adelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1932	1.977c., Oct. 4	1.926c., Feb. 2	$14.81, Jan. 5	$13.59, Oct. 25	$8.50, Jan. 12	$6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Steel Market Waits for Post-Election Impetus

PITTSBURGH, Nov. 7.—While the steel industry generally is marking time, many individual instances of a continued gain over October are reported. Fair-sized orders have been placed by the automobile industry in the last week and, while a majority of the sheet and strip tonnage went to Michigan mills, Pittsburgh and Valley producers shared to some extent and also took a portion of the bar orders placed.

Structural awards have been light, but railroad buying continues and a large inquiry is expected soon from the New York Central. The Norfolk & Western has placed 1300 tons of plates for car repairs. A little farm implement business has come in recently, but demand for steel from the farming industry generally continues light. Movement of wire fencing has been particularly disappointing. Tin mill schedules are off slightly, as specifications have practically ceased pending the announcement of the 1933 price.

Steel ingot production in the Pittsburgh district has not changed, in spite of resumption by the local rail mill. Steel is being supplied by a nearby plant and no open-hearth furnaces have been added. Steel-making schedules in the Valleys are off slightly to 16 per cent, while the Wheeling district is holding its own.

With the exception of the small falling off in tin plate, finishing mill schedules in the Pittsburgh district have not changed materially. Heavier rolling of sheet and strip are promised and are assured in some instances by automotive orders. Structural steel production is well maintained by releases of large jobs placed during the summer. Finished steel prices have not changed in the last week and are comparatively firm on small orders which make up the bulk of current business. Automobile body sheets are still weak, but other forms for flat-rolled steel are comparatively well held. No further changes in railroad accessory prices are reported.

Pig Iron

Scarcely any tonnage is coming out, but shipments against contracts are holding at about the same level that prevailed last month. Inquiry is very light, but a few orders have been scheduled to be closed after the election. Prices are maintained on small lots in this district, and no deviations are reported in the Valleys, except in cases where the competition of Lake furnaces is encountered.

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Fair-sized orders have been placed by the automobile industry and railroad buying is somewhat more active.

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Ingot output at Pittsburgh and in the Wheeling district is being maintained, but Valley operations are off slightly.

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Tin plate production has receded to 45 per cent of capacity. Specifications have virtually ceased pending announcement of the 1933 price.

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Semi-Finished Steel

Shipments of sheet bars to tin mills are well maintained in this and nearby districts, but the requirements of sheet and strip producers are somewhat lighter. Wire rods have recently been slightly more active, and bolt and nut makers have been running at a better rate. Billets, slabs and sheet bars are firm at $26, Pittsburgh, and forging billets are quoted at $31. No deviations in the $37 price on wire rods are reported.

Rails and Track Accessories

No more inquiry for rails has appeared in this district, but producers are negotiating with the carriers for the placing of tonnage before the end of the year. The market for accessories is also rather dull, and no more price changes are in prospect. Movement of light rails is almost entirely lacking, with the price quoted at $30 a ton, Pittsburgh. Rerolled rails are bringing $26.

Bolts, Nuts and Rivets

Increasing specifications from the railroads are still helping the bolt and nut business, although the improvement noticed recently in general demand has begun to subside. Prices are well maintained, with bolts and nuts quoted at 75 per cent off list, large rivets at $2.25 a 100 lb., and small rivets at 70, 10 and 5 per cent off list.

Bars, Plates and Shapes

This market has been rather dull in the last week, with structural awards rather light and general tonnage for construction projects slow to be placed. Scarcely any private work is being placed, although both structural fabricators and distributers of reinforcing bars report a mild increase in the number of private projects before the trade. Buying by the railroads is still the feature of the plate market, and the Norfolk & Western placed approximately 1300 tons last week for the repair of 500 cars at its Roanoke, Va., shops. No estimate of the tonnage to be required by the New York Central for the repair of cars can be made in view of the wide latitude given the road in specifying the uses to which the money obtained in its recent loan can be put. Nevertheless, the most conservative figure mentioned is 10,000 tons, and twice this amount might be spent if some of the programs offered are followed. The barge market is still quiet, and steel for oil tankage has failed to show any improvement.

Prices are still well maintained, even though some of the tonnage recently placed by the railroads is reported to have developed concessions on plates in the East.

Cold-Finished Steel Bars

Demand has been lighter in the last week, but inquiry from the automobile industry is heavier, and the promise of tonnage from this source is much better than it was last month. Most producers have practically doubled their output since the low point in August, and do not feel that this level will again be reached. The base price is well maintained at 1.70c., Pittsburgh, on lots of 10,000 to 19,999 lb. for shipment at one time to one destination.

Tubular Goods

Aggregate pipe tonnage has fallen off a little in the last week or two, and production is very light this week. Seamless and electric-weld units are generally inactive, although butt-weld mills are running a day or two a week to meet current demands for standard pipe. The gasoline-carrying line from Toledo to Detroit, which was mentioned last week, is still active, but other line-pipe projects are lacking. Oil country goods are dull, but demand for boiler tubes and mechanical tubing is fairly well maintained.

Wire Products

Tonnage has not fallen off materially in the last week, and one producer reports a slight increase over the October level. Manufacturers' wire is holding up fairly well, as jobbers are not taking merchant products in recent volume, and movement of fencing

to the agricultural districts is very disappointing. Demand for road mesh is fairly well sustained and may keep up in fair volume during the winter. Wire prices are generally holding.

Strip Steel

Increased activity in the automobile industry has given this market a better tone, although actual orders have not increased substantially. In fact, miscellaneous consumers are limiting their requirements further, and current shipments to automobile and parts makers have not yet increased materially. Present tonnage is largely for experimental uses, but volume orders are expected before the month is over. Prices are holding much better than they were a few weeks ago, with no deviations reported from the 1.45c., Pittsburgh, price on hot-rolled strip. Cold-rolled material is also generally quoted at 2c., and small and moderate-sized consumers have not been able to secure lower quotations.

Sheets

The placing of orders by the automobile industry has given the sheet market a better tone, although Pittsburgh and Valley mills have not shared heavily. Improved demand for sheet steel from the agricultural implement industry is also noticed. Some inquiry for car roofing sheets has appeared. Buying by jobbers is light, and small manufacturing consumers are limiting their current needs. Prices of galvanized, hot-rolled annealed and ordinary hot-rolled sheets are well held, but weakness persists in auto body and light cold-rolled sheets. Concessions are reported on long ternes in some cases.

Tin Plate

Production schedules have been checked slightly this week, but are still fairly well maintained by the rolling of anticipated tonnage. The average for the industry has dropped under 45 per cent, but announcement of the 1933 price in the next week or two is expected to give some impetus to releases.

Coke and Coal

Moderate increase in demand for foundry coke is reported by some sellers this week. Individual orders are small, but aggregate tonnage is slightly heavier. Domestic coal and coke are more active as the cold weather approaches. Furnace coke is very quiet, and the prices continue weak.

Scrap

With the exception of the purchase of a large tonnage of heavy breakable cast by a mill in the district, the market has been unusually quiet in the last few days. The price paid for this material ranged from $8.25 to $8.50, confirming the recent quotation on cast scrap. No. 1 cast, however, is a little weaker, even though there is a wide divergence in the prices being paid at various consuming points. The No. 1 heavy melting steel on the recent Pennsylvania list is not believed to have been sold, as quotations were rather low. The Baltimore & Ohio list, closing on Nov. 14, contains 5500 tons, including 3000 tons of wheels.

Valley Operations Decline Despite Increased Automotive Business

YOUNGSTOWN, Nov. 7.—Increasing orders from the automotive industry have enabled steel makers in the Youngstown district to maintain their tonnage in the first week of the month at a level not far below that which prevailed in the corresponding October period. Nevertheless election uncertainty has brought about a contraction of orders in many lines of finished steel, and the outlook for November is frankly less promising than it was a month ago.

Production of pipe has fallen off to some extent as distributers are hesitant in making further additions to their stock, and little direct business is coming out. The only line-pipe project which is considered active by Youngstown producers is a gasoline-carrying line from Toledo to Detroit, which will take about 4000 tons of 6-in. material. Output of tin plate in the Valleys is well maintained because of the comparatively high schedules of the leading producer in the Shenango area. Most of the tonnage being produced is anticipatory, although some of it can be shipped in the present year. Orders for sheets and strip steel were rather light in the last half of October, but activity in the automotive industry is bringing more inquiry and tonnage promises to improve in the next fortnight. Wire products are quiet, and bars and plates are dull. Valley mills are not sharing heavily in orders by the Eastern railroads for car repair purposes, and the tonnage of plates going into oil tanks is rather insignificant.

Open-hearth steel production in the district this week is considerably lower because of the closing down of one large plant, although the loss of tonnage will be made up to some extent by heavier Bessemer production. The comparatively heavy requirements of tin mills are doing much to maintain output in the district, although aggregate steel-making schedules of mills in the Valleys and northern Ohio, outside of Cleveland, will not be above 16 per cent this week. Sheet and strip production has fallen under 20 per cent, but the district tin plate output averages better than 50 per cent.

Steel prices are holding in a general way, although weakness persists on automotive body and light cold-rolled sheets. While efforts are being made to hold these products at 2.65c. and 2.50c., Pittsburgh, respectively, shading of $2 a ton is not uncommon on auto body material. Galvanized sheets are well maintained at 2.85c., and hot-rolled annealed sheets are quotable at 2.10c. to 2.20c. Even the lower figure is subject to pressure in the Detroit district. Bars and plates are well maintained at 1.60c., Pittsburgh, and quotations on wire products are considered strong.

The raw material markets are quiet, as steel companies are not making forward commitments at this time. Shipments of scrap are light, and No. 1 heavy melting steel is not quotable at above $9. Hydraulic compressed sheets are scarce and may be quoted at the same level as steel. Pig iron is without feature, as no significant buying has been reported in the district in recent weeks.

St. Louis District Stove Makers Melt More Iron

ST. LOUIS, Nov. 7.—An increase in the melt of pig iron by manufacturers of stoves and heating appliances, who have been the leading consumers in the St. Louis industrial district for several months, is reported. Activities by smaller jobbing foundries also has been on the increase within the last few weeks. Malleable and basic consumption continues very light. The market is unchanged.

Steel

This has been one of the quietest weeks of the year in all branches of the steel industry. There has been an apparently universal desire to postpone action until after the election. Warehouse business here in October, usually the best month of the year, was disappointing, having been slightly below the volume for September. A further falling off in business for November is noted.

Scrap

Additional sales of cast scrap and stove plate were made during the week to district mills at unchanged prices. Railroad lists: St. Louis-San Francisco, 23 carloads; St. Louis-Southwestern, 32 carloads of various items and 250 carloads of carwheels. Wabash, 2500 tons.

New Automotive Business Helps Sustain Chicago Steel Output

CHICAGO, Nov. 7.—Ingot output for the district as a whole still stands at 18 per cent of capacity, though several minor adjustments have taken place. Some small rail releases against old contracts have permitted one rail mill to resume operations on a light schedule that will extend over about a two weeks' period. On the other hand, two open-hearth furnaces have been taken out of service.

An indication that some of the election tension has been released is shown by the fact that both sales and new specifications for finished steel are the best in three weeks, the margin, however, being very small. The greatest part of new business is coming from automobile manufacturers who build light and low-priced cars. Railroad business remains very sluggish and farm implement manufacturers have yet to make a start on fall schedules.

From all divisions of the iron and steel market come reports that October business was the best since early last spring and some statements place last month as the best so far this year.

The scrap market remains quiet, with current sales near the low point of the year. Boat movements of heavy melting steel from Chicago are relieving the strain of distress tonnages that accumulated during the summer. However, dealers are more conservative in their bids and offered prices are gradually sinking.

Pig Iron

Improvement in demand is still noted, but the upward swing is not so sharp as in the previous month. A large part of the current gain in shipments is traceable to automobile plants that are in production on new models. New buying is less active.

Bolts, Nuts and Rivets

Shipments so far in November show no improvement over the average in recent weeks. Slightly larger quantities are moving to automobile plants, but the jobbing trade does not seem to be able to get under way.

Reinforcing Bars

Transactions are few in number. Bids have recently been taken on Illinois road work, but it is unlikely that much tonnage other than bridge steel will be bought this winter. Prices are still low, and in general sellers are not anxious to take large lots of slab bars at present quotations for delivery next spring when they hope the market will be stronger. Among current awards are small lots for miscellaneous buildings for the World's Fair and for post offices.

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Market shows signs of release from election tension, finished steel specifications having shown a slight gain.

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Raw steel output is unchanged at 18 per cent of capacity, but two open-hearth furnaces have been taken out of service.

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Releases against old rail contracts have enabled a local rail mill to resume operations.

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Warehouse Business

October shipments marked a gain over September and the tendency is still upward, though progress is slow. The trend, it is pointed out by warehousemen, is normal and is in contrast with a year ago when demand was on a downward path. Movement of jobbing material over the next few weeks is expected to be steady, though there is possibility of a moderate increase about the end of the month.

Structural Material

Interest centers around two Illinois bridges on which bids recently were opened. Little private work is pending. Railroads are entering the market for small tonnages, the largest being 130 tons for the Milwaukee Road.

Sheets

Demand remains spotty, orders being small but frequent. The aggregate of releases is sufficient to hold output at 20 per cent of capacity. Recent downward price changes have not resulted in heavier buying.

Wire Products

A moderate slackening in demand was not unexpected by sellers, who point out that in only four out of the last 17 years have specifications for wire products held up at the end of October. Usually, however, there is a rebound in November before the year-end recession sets in. Furniture manufacturers and makers of mattresses are using more spring wire, this being especially true in border States between the North and the South. There is a slightly heavier movement to automobile manufacturers.

Plates

Use of this commodity remains light, with only small quantities moving to plate shops. Prospects for car work are not so bright in the West as in the East.

Cast Iron Pipe

This market is dormant, the only sizeable project being the one at Wilmette, Ill. Municipal work is retarded by the fall elections and public utilities are holding out of the market.

Rails and Track Supplies

A few rail releases have been made against old contracts and one local mill has resumed operations, which will be maintained on a low scale for several weeks. No word comes from Northern railroads, which usually buy in time to accept shipments by water before the close of navigation.

Bars

Demand is bolstered somewhat by the increased needs of automobile manufacturers who build in the lower price range. Dealers are reported to have low stocks of both used and new cars. Farm implement plants remain virtually idle, but prospects are that some resumption of activity may take place before the end of the month.

Scrap

Dealers are paying $6 a ton and sometimes slightly more for heavy melting steel that is being delivered to docks for a second shipment by boat to Lake Erie. Practically the full tonnage for the second boat, one having left last week, is now accumulated and the fact that dealers are still buying indicates that possibly a third cargo will move out before the close of navigation, which will be some time about Nov. 15. These transactions are having no immediate effect on the local market beyond strengthening prices for heavy melting steel at the present quotation. Only one steel mill remains an active buyer at this time and the tonnages it is taking are small and come at rather frequent intervals. The practice of other consumers is to reduce inventories. Sellers of scrap anticipate that even a moderate increase in ingot production will stimulate sales.

Eastern Pennsylvania Trade in Steel and Pig Iron Drops

Business Affected by Election—Norfolk & Western Orders Plates for Car Repair Program

PHILADELPHIA, Nov. 7.—Further retreat of the market is evident. Consumers apparently are awaiting the outcome of the Presidential election before coming to mills for tonnage. Operations, however, remain at about 14 per cent of steel-making capacity.

The Norfolk & Western Railroad has placed 1300 tons of plates with the Wheeling Steel Corpn. It is now reported that the Pennsylvania has not distributed all its tonnage for the building of 1285 all-steel box cars. It is said about three-fourths of the tonnage has been awarded.

Pig Iron

The market is extremely dull. A recent sale of about 6000 tons of basic iron by an eastern Pennsylvania furnace to a central Pennsylvania melter has been reported. Both malleable and low phosphorus iron have softened in price. After long inactivity, the blast furnace of the Alan Wood Steel Co., at Swedeland, Pa., was blown in yesterday. This furnace is understood to have a fair-sized backlog of orders.

Plates, Shapes and Bars

Further curtailment in demand is noted. The Norfolk & Western has placed 1300 tons of plates with the Wheeling Steel Corpn. to be used in the repair of 500 hopper cars. The work also calls for about 60 tons of angles and bars, which went to a large Pittsburgh maker. The Reading has ordered an additional lot of plates from a nearby mill for use in a car repair program. About 700 tons is still to be distributed. Bids will be opened Wednesday by the Lighthouse Service for the lighthouse tender Hemlock, requiring 300 tons of plates. The Department of Supplies, State of Pennsylvania, has awarded 154 tons of bridge beams to the Jones & Laughlin Steel Corpn., the Belmont Iron Works and the Phoenix Bridge Co. It has also awarded 140 tons of beams to the Morris Wheeler Co.

Warehouse

Inquiries and orders coming to jobbers have showed a substantial drop since the first of the month. Prices are unchanged.

Imports

Imports at Philadelphia last week consisted of 296 tons of pig iron from British India and 36 tons of pig iron from Norway.

Scrap

The market remains dull. Couplers and knuckles, rolled steel wheels and cast grades have declined 50c. a ton.

Sheets

Despite the market uncertainty because of the election, sheet steel demand was sustained the past week at about 30 per cent of capacity. This level has been well established for the past two months, although orders from each industry are not large. Prices are steady, but mills are not willing to quote for first quarter at present schedules despite the desire of some consumers to be protected.

Scrap

Substitution of scrap for pig iron by some small foundries in this district has tended to increase carlot orders slightly. Substantial business is still lacking, primarily because of mill pressure on prices. Scarcely any mill sales are being made because dealers cannot buy at prices which enable them to make their usual profit.

Boston Market Quiet

BOSTON, Nov. 7.—Not much change is noted in the general business situation. The Mystic Iron Works did a better business the past week, and small lots of Alabama, Buffalo and Indian pig iron were sold, but aggregate business fell considerably under 1000 tons. There are no inquiries in the market, but various melters have privately expressed the opinion that they will place orders for iron in December for first quarter delivery. The price situation is unchanged.

Buying of scrap is largely confined to an occasional car of No. 1 heavy melting steel, heavy cast, textile machinery cast, stove plate, engine blocks and bundled skeleton, but the aggregate tonnage is so small the market has the appearance of being practically at a standstill. Recently 39 gross tons of steel scrap was shipped from here to Japan via the Canal.

Almost every steamer arriving here from abroad has foreign steel products for New York concerns. Some of this material is being offered to New England contractors at prices well below those at which domestic steel can be obtained. As a result, the local market for domestic billet reinforcing bars is abnormally quiet.

Cincinnati Pig Iron Market Dull

CINCINNATI, Nov. 7.—Pre-election influences tended to depress the already dull pig iron market in this district the past week. New business did not exceed 500 tons, of which 300 tons was for a southern Ohio melter for use during the remainder of the quarter. Prices on Northern iron are being quoted at present published schedules, but successful bids show the influence of close competition. Some easing of the melt is noticed among stove foundries, which have accounted, during the past few weeks, for a small improvement in general foundry operations.

One-Piece Type of Manganese Trackwork

William Wharton, Jr., & Co., Inc., Easton, Pa., has developed an improved one-piece type of special manganese trackwork, known as Spanweld, which is said to combine the proved wear-resisting qualities of 12½ per cent manganese steel with the high strength and other favorable characteristics of one-piece, all-steel construction. In addition, Spanweld can be entirely maintained by welding in the track. In this type of special trackwork, through open-hearth rails are interlocked and welded and then reinforced with welded angular reinforcing plates. A solid manganese steel body is then fitted over the through rails and securely welded at all points of contact.

Detroit Scrap Mart Dull

DETROIT, Nov. 7.—The local scrap market is marking time until after the election, with activities on the part of both consumers and dealers at low ebb. Prices are unchanged, but continue to show a weak tendency. Dealers now have before them the largest scrap lists in six months, a reflection of the pickup in automobile production this month.

"Next Steps: a Post-Election Stock Taking," will be the general topic of a conference to be held by the American Academy of Political and Social Science, in cooperation with the Taylor Society, at Witherspoon Hall, Philadelphia, Nov. 11 and 12. Subjects to be discussed include: The immediate unemployment problem; the long run unemployment problem; competition versus cooperation in business; must there be a new approach to the problems of industry; and how can the Federal expenditures be reduced.

Cleveland Steel Output Rises To 35 Per Cent of Capacity

Pre-Election Hesistancy Has Slowed Up Buying of Virtually All Consumers Except Automobile Makers

CLEVELAND, Nov. 7.—Ingot production has been stepped up in Cleveland by the lighting of an additional open-hearth furnace by the American Steel & Wire Co., increasing the local output three points to 35 per cent of capacity. However, it seems improbable that the present rate of operations will be maintained. The finished steel market was very dull in the past week. Consumers generally are deferring purchases until after election and considerable improvement in orders is looked for after the election result is known regardless of which candidate wins.

The automotive industry has not shown the pre-election hesitancy displayed by other consumers, as some of the motor car manufacturers have gone ahead with purchases and the release of specifications to carry out their previously announced production schedules. Additional purchases and releases have been made by the Chevrolet Motor Car Co. which still has more steel to buy to carry out its scheduled production of 110,000 cars by Feb. 1. Additional orders for steel have also come from makers of accessories for Chevrolet cars.

Demand from the railroads has been enlivened by the release by the Chesapeake & Ohio of substantial orders for spikes, bolts and nuts, tie plates and switches. This road bought 47,000 tons of rails for 1932, a large portion of which has not been laid. It has authorized the laying of 35 per cent more of the rails and has released the remaining 50 per cent of its track fastenings that were purchased to go with the rails but which were held up. In addition, the Chesapeake & Ohio has purchased 55 tons of screw spikes.

Prices generally are being well maintained on most products. While there are irregularities on some finishes of sheets, these are no more prevalent than they have been.

Pig Iron

As consumers are deferring buying until after election, sales were very light during the week. With the placing of business that is now backing up, a little spurt of activity is looked for during the next week or two. Some new releases have come from automobile foundries which ordered very little iron in October. While these so far are for small lots, makers are encouraged to believe that there will be a further improvement in the demand from that source. Prices are steady.

Iron Ore

Considerable headway has been made this year in reducing iron ore stocks. With a water movement of only about 3,500,000 tons for the season, the supply of Lake Superior ore in furnace yards and on Lake Erie docks on Dec. 1 will show a reduction of over 8,000,000 tons as compared with Dec. 1 last year. Stocks in furnace yards and on docks Dec. 1 are estimated at slightly over 31,000,000 tons, as compared with 39,232,000 tons on the same date a year ago. The average on Dec. 1 for a nine-year period was 41,280,000 tons. While stocks on Dec. 1 will be about 10,000,000 tons less than the average on that date since 1923, the rate of consumption with present blast furnace operations has been reduced to such an extent that there will be a large surplus over the normal average at the opening of navigation next May. At the rate Lake ore is now being used less than 4,000,000 tons will be consumed between Dec. 1 and May 1. But even if there is no gain during the winter months the supply on docks and furnace yards May 1 will be reduced to about 27,000,000 tons, or 6,500,000 tons less than on the same date this year. The normal amount on docks and furnace yards May 1 is about 20,000,000 tons.

Bolts and Nuts

Demand from the motor car industry has improved, some fair-sized orders having come from that source during the week. Railroads are ordering slightly more freely. October business shows a moderate gain over September and the improvement is expected to be maintained this month. Prices are firm.

Strip Steel

Additional releases in fair-sized lots have come from some of the automobile accessory plants making Chevrolet equipment. The orders indicate that these plants have good production schedules for the remainder of November. Demand from local stamping plants shows some gain. Hot-rolled strip is firm at 1.45c., Pittsburgh, and cold-rolled material is now well maintained at 2c., Cleveland.

Bars, Plates and Shapes

Interest of fabricators is centered in the Cleveland post office, for which bids will be taken Nov. 15. This is expected to take 11,000 tons, or somewhat more than the preliminary estimates, which called for 10,000 tons. New inquiry for fabricated steel is light. Merchant bar sales are limited to small miscellaneous lots. Bids for the Brook Park bridge, requiring 1000 tons of reinforcing bars, will be taken Nov. 22. A welded pipe line requiring 1100 tons of plates has been placed by Fort Wayne, Ind. Prices are steady.

Sheets

Some additional business came from the motor car industry during the week, but not in large enough lots to warrant an increase in plant operations. Generally the market is quiet. A slightly better demand is reported from the refrigerator manufacturers. Galvanized sheets are moving well to makers of house-heating furnaces. Prices seem to be fairly well stabilized at the range in quotations that has recently appeared.

Scrap

With no new demand from consumers the market is very quiet. A local mill continues to take steel-making scrap in restricted quantities, but no blast furnace scrap. There is no activity in the Youngstown district. Prices are steady on steel-making grades, but nominal on blast furnace scrap.

Buffalo Steel Ingot Production Gains

BUFFALO, Nov. 7.—Shipments of pig iron showed a decided pick-up in October, but as the barge season is about ended, these may be expected to drop off. It is known that at least one or two sizeable inquiries are out, but negotiations are being conducted confidentially. The usual number of carload sales are reported.

Steel

The Lackawanna plant of Bethlehem Steel has increased its open-hearth operation to four furnaces and may increase to five this week. Republic Steel continues to run two open-hearths and Wickwire Spencer one. The Seneca division of Bethlehem is operating at 15 per cent on sheets. Action has been postponed until Nov. 10 on the Binghamton armory, which calls for 400 tons of structural and 100 tons of reinforcing bars. Action has been indefinitely postponed on the new water supply system at Wingdale, N. Y., involving a tonnage of reinforcing bars. A State highway bridge in Delaware County will require 100 tons of structural steel.

Scrap

Sales are confined to carload lots of No. 1 machinery cast at $10. A mill which has been buying No. 2 heavy melting steel during recent weeks is receiving this material at the rate of about one carload per week from each of three shippers. The largest consumer in the district, having a stock pile of 100,000 tons, is using about 1000 tons a week.

New York Steel Market Quiet; Orders Reflect Meager Stocks

Election Campaign Has Had a Depressing Effect Upon Business for Two or Three Weeks

NEW YORK, Nov. 7.—There is a feeling of relief in steel trade circles that the election campaign is over, for it undoubtedly has had a depressing effect upon steel business in this territory. The past week has been exceedingly quiet, total bookings in the past two or three weeks having been at a smaller average than those of the first half of October. One favorable development is the release of some small orders by the New York Central for car repair work, but nothing has been done on its larger program of repairs, for which the Reconstruction Finance Corporation has granted a loan of $2,500,000.

There are frequent evidences of the lack of steel stocks in the hands of manufacturing consumers. Almost every day steel sales offices receive one or more requests for steel to be shipped out of stock, if stocks are available, as the buyers are in such haste that they do not want to wait for mill rollings. In some such instances, when supplies could not be obtained from mills, consumers have been obliged to call upon jobbers.

Inquiries for other than small lots are rare, but one of fair size for plates comes from the Department of Plant and Structures, New York City, which will use 240 tons for repairs to East River bridges.

Pig Iron

The extreme cautiousness that has characterized buying during the pre-election period was particularly evident during the final week of political campaigning. Though last week's bookings of 3000 tons were double those in the preceding week, the routine character of transactions signified no general uptrend in demand. The easy flow of deliveries that began in October is now being retarded somewhat by diminishing melts at foundries which had been enjoying a seasonal bulge in business. Prices are unchanged.

Scrap

Sales into consumption are still scarce. The only relatively important transaction during the week involved a bargeload of stove plate for delivery to Bayonne, N. J., for which a dealer paid $4.50 a ton. No. 1 heavy melting steel is still being loaded at $4.50 for export to Japan. Shipments are sporadic, though no important hold-ups are reported. Prices are unchanged.

Bridge Cable Award of 25,000 Tons and Large Pipe Letting on Coast

SAN FRANCISCO, Nov. 7.—Although the largest cast iron pipe letting of the year was made at Los Angeles during the past week, and the largest steel cable award ever placed on the Pacific Coast was consummated at San Francisco, general activity has continued at minimum, with scant prospect of change for the better until after January 1 at least. Seasonal requirements have been largely taken care of, little major construction is imminent, and public works budgets have been covered for the balance of the year.

The city of Los Angeles awarded 7500 tons of centrifugal cast iron pipe for new lines and replacements. The largest lot, 5000 tons, went to the United States Pipe & Foundry Co. for $185,355, and this included 6, 8 and 12-in. R. D. Wood & Co. were awarded 1200 tons of 12-in.

For the Golden Gate bridge across the entrance to San Francisco Bay, connecting the city with the north or Marin County shore, the directors of the district awarded a contract for manufacturing and erecting cables and suspenders to John A. Roebling's Sons Co. for $5,855,000. The estimated tonnage is 24,890. Other contracts for approaches, piers and anchorages will require 10,700 tons of structural steel and 6000 tons of bars, and these sub-contracts will be placed later by the general contractors.

Both mill and out-of-stock prices on reinforcing bars continue weak in the San Francisco territory.

Mining Industry Is Active Steel Consumer in Canada

TORONTO, ONT., Nov. 7.—The mining industry is responsible for about the only really bright spot in Canada's industrial operations. Considerable expenditures have been made on mining tools and equipment, and there has been some construction work calling for structural shapes. A number of new mills have been erected and others are pending, which will result in heavy purchases of equipment. In addition many companies have outlined programs for the winter and next year which will call for heavy expenditures on new equipment and tools.

Pig Iron

While there was something of a spurt in sales a week ago, new business has recently tapered off. Purchases for the week fell under the 500-ton mark, and were made up of single car orders. Production shows no change. One stack at Hamilton, Ont., is blowing with an output of around 350 tons per day.

Scrap

Business has shown some expansion recently as the result of a better call for a wider range of scrap. Some sales of heavy melting steel have been made both in the Toronto and Montreal districts, but no large tonnage contracts have been closed. Car wheels, as well as wrought iron and steel axles, have shown new life in the Montreal market. Local dealers state that the principal demand is for machinery cast, and a steady flow of small tonnage orders is appearing. Dealers have made no revision of price lists, but continue to predict early advances in some lines.

Birmingham Pig Iron Business Lagging

BIRMINGHAM, Nov. 7.—Pig iron has been marking time during the past 10 days. Bookings and shipments of the first week in November were lower than those for the same period in October. It is believed, though, that after the election the rate will be a little better than October's. All three of the merchant producers in this district shipped more iron in October than in September, and there is hope of a further gain this month. Price quotations are unchanged, with $11 for the Southern market and $10 for the North. As for the past four weeks, five blast furnaces are in operation, four of which are on foundry iron and one on basic.

Steel

Early November tonnage has been light, and not much of a change is indicated this week. Current business is still made up of small diversified tonnages. Bookings of farm steel and industrial steel have been lagging lately. Orders for highway steel are leading. Prices are steady. Open-hearth operations remain at five active units, with no further decline in prospect at this time.

Scrap

The market is slow. Contract shipments are small and new tonnage is infrequent. Prices are unchanged.

Fabricated Structural Steel

Bookings Decline—New Projects in Larger Volume

LETTINGS the past week were light, totaling only 4200 tons. The largest job, 925 tons, is for three bridges in Ulster County, N. Y. For the Golden Gate bridge at San Francisco, 24,890 tons for cables and suspenders has been placed with the John A. Roebling's Sons Co. The structural steel for the superstructure, 75,000 tons, was awarded some time ago to the McClintic-Marshall Corpn., but some other structural steel items remain to be awarded. New projects of 16,700 tons compare with 9400 tons a week ago. A suspension bridge at Catskill, N. Y., over the Hudson River, a loan for which has been approved by the Reconstruction Finance Corpn., will require 12,000 tons, and a State hospital building at Kings Park, N. Y., calls for 2000 tons. Awards follow:

NORTH ATLANTIC STATES

Lynn, Mass., 200 tons, post office, to an unnamed fabricator.

Brockton, Mass., 140 tons, post office, to Shippers Car Line Corpn., New York; previously reported to an unnamed fabricator.

Malverne, N. Y., 315 tons, high school, to George A. Just Co.

State of New York, 925 tons, three bridges in Ulster County, to Lackawanna Steel Construction Corpn.

Madison, N. J., 440 tons, Dodge Memorial community house, to McClintic-Marshall Corpn.

Beaver County, Pa., 270 tons, State highway bridge over Raccoon Creek, to Fort Pitt Bridge Works Co.

Baltimore, 660 tons, Patterson High School, to Lehigh Structural Steel Co.; previously reported to Armstrong Parker Co.

Marshallton, Del., 100 tons, building for Continental Diamond Fibre Co., to McClintic-Marshall Corpn.

THE SOUTH

Fredericksburg, Va., 310 tons, manufacturing building for Sylvania Products Co., to McClintic-Marshall Corpn.

Standard, W. Va., 115 tons, highway bridge, to Pittsburgh Bridge & Iron Co.

London, W. Va., 370 tons, lock and dam, to Dravo Contracting Co.

CENTRAL STATES

Chicago, 400 tons, Federal building for World's Fair, to Hansell-Elcock Foundry Co.

Chicago, 165 tons, home planning building for World's Fair, to Duffin Iron Co.

Morris, Kan., 115 tons, Santa Fe elevated structure, to St. Joseph Structural Steel Co.

WESTERN STATES

Melstone, Mont., 200 tons, bridge, to Minneapolis-Moline Power Implement Co.

Clark County, Nev., 200 tons, Muddy River bridge, to Virginia Bridge & Iron Co.; 100 tons sheet steel piling to Inland Steel Co.

Bieber, Cal., 235 tons, State highway bridge, to Moore Dry Dock Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Catskill, N. Y., 12,000 tons, suspension bridge; R. F. C. loan of $3,400,000 approved pending final action by State of New York.

New York, 2500 tons, three incinerators; all bids rejected, no date set for new bids.

New York, 1100 tons, 205th Street viaduct; all bids rejected, new bids to be taken Nov. 16.

Kings Park, N. Y., 2000 tons, State hospital building.

Stroudsburg, Pa., 105 tons, post office.

THE SOUTHWEST

State of Oklahoma, 400 tons, State highway bridges.

CENTRAL STATES

State of Ohio, 400 tons, bridge in Trumbull County; bids Nov. 18.

Fountain City, Wis., 685 tons, Mississippi River Lock No. 5; bids close Nov. 29.

Wisconsin Dells, Wis., 127 tons, Superior Street bridge; bids close Nov. 15.

Milwaukee Road, 130 tons, bridge.

Kansas City, Mo., 1600 tons, Seventh Street viaduct; project deferred until Nov. 23.

Ottawa, Ill., 1800 tons, bridge; Wisconsin Bridge & Iron Co. low bidder.

Joliet, Ill., 1000 tons, bridge; Mississippi Valley Structural Steel Co. low bidder.

Omaha, Neb., 1000 tons, post office; J. P. Cullen & Sons, general contractors.

State of Nebraska, 655 tons, highway bridges.

WESTERN STATES

Moapa, Nev., 190 tons, State highway bridge.

San Francisco, 185 tons, Best Food Co. store.

Vallejo, Cal., 120 tons, post office; bids close Nov. 10.

Gaviota, Cal., 200 tons, bridge for Southern Pacific Railroad.

Los Angeles County, Cal., 175 tons, gate structures for San Gabriel dam No. 2; Goslin Birmingham Mfg. Co. low bidder.

FABRICATED PLATE

AWARDS

Memphis, Tenn., 175 tons, two derrick boats for United States engineer, to Midland Barge Co.

Fort Wayne, Ind., 1100 tons, 42-in. pipe, to Alco Products Co.

NEW PROJECTS

New York, 240 tons, repairs to East River bridges; bids taken this week by Department of Plant and Structures.

Mare Island, Cal., 400 tons, navy yard requirements; Worth Steel Co. and Alan Wood Steel Co. low bidders.

Mare Island, 160 tons, navy yard requirements; bids close Nov. 15.

Pipe Lines

Natural Gas Pipe Line Co. of America, 20 North Wacker Drive, Chicago, plans installation of steel pipe line for service in Louisa County, Iowa.

Champion Refining Co., Enid, Okla., considering 6-in. oil pipe line near O'Connor, Okla. Cost about $21,000.

Liquefied Natural Gas Co., Foshay Tower, Minneapolis, is considering pipe line for service at Springfield, Minn. Company has secured franchises at Comfrey, Jeffers and other points in State, and plans pipe line systems.

Cast Iron Pipe

Sumner, Wash., asks bids until Nov. 15 for 6-, 8- and 12-in. pipe for water system.

Dayton, Ohio, plans early call for bids for 24-in. and smaller for water main extensions in Patterson Boulevard district. Cost about $75,000.

Los Angeles awarded 7443 tons of 6-, 8- and 12-in. centrifugal cast pipe as follows: 4973 tons to United States Pipe & Foundry Co. for $185,355; 1190 tons to R. D. Wood Co. for $41,350; 690 tons to American Cast Iron Pipe Co. for $27,250; 370 tons to National Cast Iron Pipe Co. for $14,975; 220 tons to Pacific States Cast Iron Pipe Co. for $8,680.

Burbank, Cal., will open bids on Nov. 15 for 350 tons of centrifugal cast pipe, 6-, 8- and 10-in.

Reinforcing Steel

Awards 1700 Tons — New Projects 3300 Tons

AWARDS

Jamaica, N. Y., 175 tons, post office, to Capitol Steel Co.

State of Rhode Island, 100 tons, bridge work, to Kalman Steel Co.

Los Angeles County, Cal., 285 tons, State highway structures, to Soule Steel Co.

Santa Clara County, Cal., 464 tons, State highway structures, to Soule Steel Co.

King County, Wash., 260 tons, Aurora Avenue bridges, to Pacific Coast Steel Co.

Coatesville, Pa., 130 tons, Pennsylvania State highway, to Kalman Steel Corpn.

Fredericksburg, Va., 130 tons, building for Sylvania Industrial Corpn., to Taylor Davis Co.

Lehigh County, Pa., 140 tons, State highway route 672, to Kalman Steel Corpn.

NEW REINFORCING BAR PROJECTS

State of New Jersey, 170 tons, road construction, route 21, section 2, Newark; bids to be taken Nov. 21.

State of Illinois, 1350 tons, highway work.

State of Indiana, 900 tons, highway work.

Chicago, 117 tons, building for Shellmar Products Co.

Fountain City, Wis., 365 tons, Mississippi River Lock No. 5; bids close Nov. 29.

Reno, Nev., 120 tons, post office.

Long Beach, Cal., 500 tons, municipal precooling plant; bonds voted on Nov. 8.

Alameda, Cal., 140 tons, structures for Government Island Federal base.

Trade News

Whitney Mfg. Co., Hartford, Conn., has appointed Barbour Stockwell Co., Cambridge, Mass., to sell the complete line of Whitney silent and roller chains and sprockets in the New England territory. Roller chain will be carried in stock at Cambridge.

American Hoist & Derrick Co., St. Paul, Minn., has appointed Stanley H. Smith, Midland Bank Building, Cleveland, as railroad representative in the Cleveland district.

Ingersoll-Rand Co., 11 Broadway, New York, has acquired exclusive rights to market SKF drill steel throughout the world under the trade name IR-SKF. This brand of steel was developed by the technical departments of Ingersoll-Rand Co. in collaboration with the SKF mills.

General Automatic Lock Nut Corpn., New York, has moved from 1775 Broadway, to 1819 Broadway.

Imperial Electric Co., Akron, Ohio, has appointed Bryant Machinery & Engineering Co., 400 West Madison Street, Chicago, as exclusive national distributer of its new Imperial welder.

Luria Bros. & Co., Inc., has moved its Philadelphia office to 1032 Commercial Trust Building, 16 South Broad Street.

Phoenix Iron Co. and the Phoenix Bridge Co. have moved their Philadelphia office to 2110 Girard Trust Building, 1400 South Penn Square.

Export Demand for Copper Revives; Lead More Active; Tin Steady

NEW YORK, Nov. 7.—Demand for copper, as well as for the other metals, has been exceedingly light the past week, due almost entirely to uncertainty as to the outcome of the election. Domestic prices for electrolytic copper remain firm at 5.25c. to 5.37½c. a lb., Connecticut base, the latter quotation appearing today. These prices represent custom smelters' ideas of values, the primary producers still asking 6.25c. as their nominal quotation. From abroad today there was a distinct revival of interest, and sales are reported at 5.25c. to 5.35c., c.i.f. usual European ports. Last week the quotation was 5.17½c. An authoritative statement is to the effect that copper consumption in European countries this year is not far below that for 1931. There are no definite developments in the proposed British tariff on copper nor in the coming meeting this month in New York to discuss further steps to control world output. Lake copper is unchanged.

Tin

A steady price situation in the face of a distinct lack of buying is the feature. Prices both here and in London have fluctuated within very narrow ranges. Quotations for spot Straits tin have hovered close to 23.30c. a lb. for over a week. The New York quotation today was 23.65c., due to better buying late today. In London today prices were £153 5s. for spot standard, £153 17s. 6d. for future standard and £159 for spot Straits, all £1 a ton higher than on Nov. 1. The Singapore market today was £158 10s. as against £158 on Nov. 1. A more active market is looked for after election.

Lead

The appearance of some demand for December lead has resulted in a considerably more active market. Sales are reported as having been fairly good for both November and December delivery. As a result, prices are very firm at 2.90c., St. Louis, and 3c., New York. Metal at 2.87½c., St. Louis, available last week, has entirely disappeared.

Zinc

There has been no buying by consumers and no pressure to sell by producers for more than a week. It is not surprising, therefore, that the quotation for prime Western remains firm and unchanged at 3c. a lb., East St. Louis, or 3.37c., New York. A favorable development is the decline in stocks during October by 3955 tons, leaving the total at 119,100 net tons. There was also a decrease in tonnage for forward sale of 5700 tons, leaving the total at 10,333 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	Nov. 2	Nov. 3	Nov. 4	Nov. 5	Nov. 7
Lake copper, New York	5.25	5.25	5.25	5.25	5.25
Electrolytic copper, N. Y.*	5.00	5.00	5.00	5.00	5.00
Straits tin, spot, N. Y.	23.35	23.35	23.30	....	23.65
Zinc, East St. Louis	3.00	3.00	3.00	3.00	3.00
Zinc, New York	3.37	3.37	3.37	3.37	3.37
Lead, St. Louis	2.90	2.90	2.90	2.90	2.90
Lead, New York	3.00	3.00	3.00	3.00	3.00

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.87½c. a lb., New York.
Brass ingots, 85-5-5-5, 5.75c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	25.50c. to 26.50c.
Tin, bar	27.50c. to 29.50c.
Copper, Lake	7.50c. to 8.50c.
Copper, electrolytic	7.25c. to 8.25c.
Copper, casting	7.00c. to 8.00c.
*Copper sheets, hot-rolled	15.37½c.
*High brass sheets	12.50c.
*Seamless brass tubes	15.25c.
*Seamless copper tubes	14.37½c.
*Brass rods	10.25c.
Zinc, slabs	4.37½c. to 4.87½c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	3.75c. to 4.25c.
Lead, bar	5.25c. to 6.25c.
Lead sheets	6.75c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.	16.00c.
Solder, ½ and ½	15.50c. to 16.50c.
Babbitt metal, commercial grade	21.00c. to 32.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	27.50c.
Tin, bar	29.50c.
Copper, Lake	7.25c.
Copper, electrolytic	7.25c.
Copper, casting	6.875c.
Zinc, slab	4.25c. to 4.50c.
Lead, American pig	3.75c. to 4.00c.
Lead, bar	7.25c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	16.50c.
Babbitt metal, high grade	31.25c.
Solder, ½ and ½	17.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.00c.	4.75c.
Copper, hvy. and wire	3.75c.	4.50c.
Copper, light and bottoms	2.75c.	3.50c.
Brass, heavy	1.875c.	2.625c.
Brass, light	1.375c.	2.00c.
Hvy. machine composition	2.75c.	3.50c.
No. 1 yel. brass turnings	2.25c.	2.625c.
No. 1 red brass or compos. turnings	2.50c.	3.25c.
Lead, heavy	2.125c.	2.50c.
Zinc	1.25c.	1.625c.
Cast aluminum	3.50c.	5.00c.
Sheet aluminum	7.50c.	9.25c.

X-Ray Examination of Metals Discussed

The importance of the X-ray in the examination of industrial materials was emphasized by Prof. George L. Clark, University of Illinois, in addressing a meeting of the chemical societies of the New York area held at the Grand Central Palace, Nov. 4, at which he was awarded the Grasselli Medal of the American Section of the Society of Chemical Industry for 1932.

"We look forward to the time when the railroads of the United States will be equipped as a matter of course, as the German railroads are, with X-ray testing cars which can be run alongside locomotive fire boxes or boilers and tested for incipient failure," he said. "The value of radiography in revising foundry and welding technique alone is probably beyond the powers of the imagination."

He pointed out that radiographic examinations often disclose the existence of defects in metals dangerous to property and even to human life. Diffraction analysis of the ultimate structure of materials is of more significance, however, Professor Clark said. Likening the X-ray diffraction methods to a super-microscope, he explained that information derived in this manner was based on the skeleton structure of the material, as the construction of a building is revealed by a study of the architect's plans.

Experiments are being carried on to correlate results of diffraction analysis with fatigue tests on metals, particularly steel, it was stated, since there is still a great difference of opinion as to the interpretation of diffractional manifestations of strain.

"Cooperative efforts in combining X-ray work with fatigue tests have not been completed, although progress has been made and more will be expected," said Professor Clark. "One of the chief difficulties has been in providing specimens sufficiently thin for X-ray analysis.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

Base per Lb.

F.o.b. Pittsburgh mill .....1.60c.
F.o.b. Chicago .....1.70c.
Del'd Philadelphia .....1.91c.
Del'd New York .....1.95c.
Del'd Detroit .....1.80c.
F.o.b. Cleveland .....1.65c.
F.o.b. Lackawanna .....1.70c.
F.o.b. Birmingham .....1.75c.
C.i.f. Pacific ports .....2.10c.

Billet Steel Reinforcing
(as quoted by distributers)

F.o.b. P'gh mills, 40, 50, 60-ft....1.60c.
F.o.b. Birmingham, mill lengths....1.75c.
F.o.b. Cleveland .....1.60c. to 1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist. .....1.35c. to 1.45c.
F.o.b. Chicago Heights mills.....1.50c.

Iron

Common iron, f.o.b. Chicago.....1.60c.
Refined iron, f.o.b. P'gh mills.....2.75c.
Common iron, del'd Philadelphia....1.86c.
Common iron, del'd New York.....1.90c.

Tank Plates

Base per Lb.

F.o.b. Pittsburgh mill .....1.60c.
F.o.b. Chicago .....1.70c.
F.o.b. Birmingham .....1.75c.
Del'd Cleveland .....1.8035c.
Del'd Philadelphia .....1.7935c.
F.o.b. Coatesville .....1.70c.
F.o.b. Sparrows Point.....1.70c.
Del'd New York .....1.898c.
C.i.f. Pacific ports.....2.00c.
Wrought iron plates, f.o.b. P'gh....3.00c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh mill .....1.60c.
F.o.b. Chicago .....1.70c.
F.o.b. Birmingham .....1.75c.
F.o.b. Lackawanna .....1.70c.
F.o.b. Bethlehem .....1.70c.
Del'd Cleveland .....1.8035c.
Del'd Philadelphia .....1.7495c.
Del'd New York .....1.88775c.
C.i.f. Pacific ports (standard).....2.10c.
C.i.f. Pacific ports (wide flange)....2.20c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh .....1.90c.
F.o.b. Chicago mill .....2.05c.
F.o.b. Buffalo .....2.00c.

Alloy Steel Bars

(F.o.b. recognized basing points.)

Alloy Quantity Bar Base, 2.45c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.25
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.35
Rounds and Squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Base per Lb.

Bars, f.o.b. Pittsburgh mill.....1.70c.
Bars, f.o.b. Chicago.....1.75c.
Bars, Cleveland .....1.75c.
Bars, Buffalo .....1.75c.
Bars, Detroit .....1.90c.
Bars, eastern Michigan.....1.95c.
Shafting, ground, f.o.b. mill.....
1¼ in. 3.00c.
1-3/16 to 1½ in. 2.50c.
1-9/16 to 1⅞ in. 2.35c.
1-15/16 to 2⅞ in. 2.20c.
2-15/16 to 6 in. 2.05c.

*In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

Base per Lb.

No. 10 f.o.b. Pittsburgh .....1.55c.
No. 10 f.o.b. Chicago mill.....1.65c.
No. 10 del'd Philadelphia .....1.86c.
No. 10 f.o.b. Birmingham .....1.70c.
No. 10, c.l.f. Pacific Coast ports..2.17½c.

Hot-rolled and Annealed

No. 10, Pittsburgh .....1.70c.
No. 10, Chicago mills .....1.80c.
No. 10, Birmingham .....1.85c.
No. 10, Pacific Coast ports.....2.32½c.
No. 10, wrought iron, Pittsburgh...3.60c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh..2.10c. to 2.20c.
No. 24, f.o.b. Ch'go mills..2.20c. to 2.30c.
No. 24, del'd Philadelphia..2.41c. to 2.51c.
No. 24, f.o.b. Birmingham .....2.35c.
No. 24, c.l.f. Pacific Coast ports....2.85c.
No. 24 wrought iron, Pittsburgh....4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh .....2.00c to 2.10c.
No. 10 gage, f.o.b. Chicago mills .....2.10c. to 2.20c.
No. 10, gage, del'd Philadelphia .....2.41c. to 2.51c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh .....2.50c. to 2.60c.
No. 20 gage, f.o.b. Chicago Mills .....2.60c. to 2.70c.
No. 20 gage, del'd Philadelphia .....2.81c. to 2.91c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh...2.55c. to 2.65c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh...2.40c. to 2.50c.
No. 20, f.o.b. Pittsburgh..2.90c. to 3.00c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh .....2.85c.
No. 24, f.o.b. Chicago mills.....2.95c.
No. 24, del'd Philadelphia.....3.16c.
No. 24, f.o.b. Birmingham.....3.00c.
No. 24, c.l.f. Pacific Coast ports....3.50c.
No. 24, wrought iron, Pittsburgh....4.95c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh .....2.80c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh.....2.60c.
No. 20, f.o.b. Pittsburgh.....3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....2.30c.
No. 28, Chicago mill.....2.40c. to 2.50c.

Tin Plate

Base per Box

Standard cokes, f.o.b. P'gh district mill $4.75
Standard cokes, f.o.b. Gary.....4.85

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. $9.50
15-lb. coating I.C. 12.00
20-lb. coating I.C. 13.00
25-lb. coating I.C. 14.10
30-lb. coating I.C. 14.90
40-lb. coating I.C. 16.70

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ in.

Base per Lb.

All widths up to 24 in., Pittsburgh.. .....1.45c.
All widths up to 24 in., Chicago.... .....1.55c.
Cooperage stock, P'gh.....1.55c. to 1.60c.
Cooperage stock, chicago...1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh .....2.00c.
F.o.b. Cleveland .....2.00c.
Del'd Chicago .....2.30c.
F.o.b. Worcester .....2.25c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....2.70c. to 2.75c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)
(After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be aplied on all merchant wire products.)

To Manufacturing Trade

Bright wire .....2.20c.
Spring wire .....3.20c.

To Jobbing Trade

Base per Keg

Standard wire nails.....$1.95
Smooth coated nails 1.95
Galvanized nails 2.95

Bas per Lb

Smooth annealed wire.....2.35c.
Smooth galvanized wire.....2.80c.
Polished staples .....2.50c.
Galvanized staples .....2.75c.
Barbed wire, galvanized.....2.60c.
Woven wire fence No. 9 gage, per net ton $55.00
Woven wire fence, No. 12½ gage and lighter, per net ton..... 60.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
⅛	51½	28½	⅛	+95	+142½
¼ to ⅜	57	34	¼ & ⅜	+5	+29½
½	62	40½	½	28	10½
¾	65½	55	¾	33	16½
1 to 3	67½	57	1&1¼	36	20½
			1½	40	23
			2	38	21

Lap Weld

2	61	50½	2	28	12½
2½ to 6	64½	54	2½ to 3½	33	18½
7 and 8	62	51	4 to 6	35	22
9 and 10	60	49	7 and 8	34	21½
11 and 12	59	48	9 to 12	31	16½

Butt Weld, extra strong, plain ends

⅛	48	33	⅛	+17	+49½
¼ to ⅜	53½	38½	¼ & ⅜	+7	+41
½	59	49½	½	23	12½
¾	63½	54	¾	33	17½
1 to 1½	65½	56	1 to 2	39	23
2 to 3	66½	57			

Lap Weld, extra strong, plain ends

2	59	49½	2	34	18½
2½ to 4	63½	53	2½ to 4	39	25
4½ to 6	62	52½	4½ to 6	38	24
7 to 8	58	47	7 & 8	36	22
9 and 10	51½	40½	9 to 12	26	13½
11 and 12	50½	39½			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3½ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes
Cold-Drawn

1 in.	61	3 in.	48
1¼ to 1½ in.	53	3½ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3½ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	44

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages takes the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30% base (carloads) 55
Carbon, 0.30% to 0.55% base..... 50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

Per Gross Ton

Standard, f.o.b. mill.....$40.00
Light (from billets), f.o.b. mill.... 30.00
Light (from rail steel, f.o.b. mill).. 36.00

Track Equipment

Base per 100 Lb.

Spikes, 9/16-in. and large.....$2.40
Spikes, ½-in. and large..... 2.40
Spikes, boat and barge..... 2.60
Tie plates, steel..... 1.75
Angle bars 2.75
Track bolts, to steam railroads..... 3.50
Track bolts, to jobbers, all sizes, per 100 count.....75 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

†Machine bolts 75
†Carriage bolts 75
Lag bolts 75
Plow bolts, Nos. 1, 2, 3 and 7 heads.. 75
Hot-pressed nuts, blank or tapped, square 75
Hot-pressed nuts, blank or tapped, hexagons 75
C.p.c. and t. square or hex nuts, blank or tapped 75
Washers*....7.80c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts 75
Semi-finished hexagon castellated nuts, S.A.E. 75
Stove bolts in packages, P'gh, 77½, 25 and 10
Stove bolts in packages, Ch'go, 77½, 25 and 10
Stove bolts in pkgs., Cleveland, 77½, 25 and 10
Stove bolts in bulk, P'gh..... 85
Stove bolts in bulk, Chicago..... 85
Stove bolts in bulk, Cleveland..... 85
Tire bolts.....60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

Base per Lb.

F.o.b. Pittsburgh or Cleveland.....$2.35
F.o.b. Chicago 2.35

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh .....70, 10 and 5
F.o.b. Cleveland .....70, 10 and 5
F.o.b. Chicago .....70, 10 and 5

Cap and Set Screws

Discounts to Jobbers

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller .....80 and 25
Milled standard set screws, case hardened, 1 in. dia. and smaller...75 and 10
Milled headless set screws, cut thread, ⅝ in. and smaller.....75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller .....80, 25 and 10
Upset set screws, sq. head, 1 in. dia. and smaller .....75, 10 and 10
Upset set screws, 1⅛ in. and larger, 75 and 10
Milled studs 70

SEMI-FINISHED STEEL

Billets and Blooms

Per Gross Ton

Rerolling, 4-in. to 6-in., inclusive, Pittsburgh $26.00
Rerolling, 4-in. to 6-in., inclusive, Youngstown 26.00
Rerolling, 4-in. to 6-in., inclusive, Cleveland 26.00
Rerolling, 4-in. to 6-in., inclusive, Chicago 26.00
Forging quality, Pittsburgh..... 31.00
Forging quality, Youngstown..... 31.00

Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton

Pittsburgh $26.00
Youngstown 26.00
Cleveland 26.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton

Pittsburgh $26.00
Youngstown 26.00
Cleveland 26.00

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(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$1.75 to $2.00
Furnace, f.o.b. Connellsville prompt	2.75 to 4.25
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b., ovens	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.20 to $1.30
Mine run caking coal, f.o.b. W. Pa.	1.30 to 1.40
Gas coal, ¾-in., f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.50 to 0.65
Gas slack, f.o.b. W. Pa. mines	0.50 to 0.65

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago

No. 3 industrial fuel oil	2.80c. to 2.90c.
No. 5 industrial fuel oil	2.45c. to 2.50c.

Per Gal. f.o.b. Cleveland

No. 3 distillate	5.00c.
No. 4 industrial	4.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 High-heat Duty Brick	f.o.b. Works Intermediate Duty Brick
Penn.	$35.00	$25.00 to $30.00
Maryland	35.00	25.00 to 30.00
New Jer.	$44.00 to 57.00	
Ohio	35.00	25.00 to 30.00
Kentucky	35.00	25.00 to 30.00
Missouri	35.00	30.00
Illinois	35.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$42.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$61.50
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$38.40 to $41.40
4-in., del'd Chicago	41.40 to 44.40
6-in., and larger, del'd New York	33.30
4-in., del'd New York	36.30
6-in., and larger, Birm'ham	$32.00 to 33.00
4-in., Birmingham	35.00 to 36.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$13.50
Bessemer	15.00
Gray forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	$14.50 to 15.00
Low phos., copper free	23.00 to 25.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.25 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	16.14
Low phos., sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent.	23.67
Bess. ferrosil'n, 15 per cent.	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	$18.30 to 18.80
Southern No. 2 fdy. del'd	18.86
Northern malleable, del'd	18.30 to 18.80
Northern basic, deliv'd	18.30 to 18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east N. J.	$17.41 to $17.66
East Pa. No. 2 fdy.	15.02 to 15.52
East Pa. No. 2X fdy.	15.52 to 16.02

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

* Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.05
*Buffalo, sil. 2.25 to 2.75	19.05
†Buffalo, sil. 1.75 to 2.25	17.41
†Buffalo, sil. 2.25 to 2.75	17.41
†Ala., sil. 1.75 to 2.25	15.64
†Ala., sil. 2.25 to 2.75	16.14

Freight rates: $5.05 all rail from Buffalo, and $3.41 to $3.91 rail and water from Buffalo when $1 barge and $2 to $2.50 New England freight rate are obtainable; $5.64 rail and water from Alabama to New England seaboard.

* All-rail rate.

† Rail-and-water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	$17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, $2.62 from Ironton and Jackson, Ohio; $3.83 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$13.59 to $14.09
East. Pa. No. 2X	14.09 to 14.59
East. Pa. No. 1X	14.59 to 15.09
Basic (del'd east. Pa.)	13.50 to 14.00
Malleable	14.74 to 18.04
Stand. low phos. (f.o.b. east. Pa. furnace)	20.00 to 21.00
Cop. b'r'g low phos. (f.o.b. furnace)	20.00 to 21.00
Va. No. 2	21.79
Va. No. 2X	22.29
Va. No. 2 plain	21.54 to 22.04
Va. No. 2X	22.04 to 22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$15.00
S'th'n fdy. sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.00
Ohio silvery, 8 per cent	21.87
Stand. low. phos., Valley	23.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$25.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (less carloads)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b.) Welland, Ont., in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$20.50	14%	$23.50
11%	21.00	15%	24.00
12%	21.50	16%	25.00
13%	22.50	17%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$18.00	12%	$20.50
7%	18.50	13%	21.50
8%	18.75	14%	22.50
9%	19.00	15%	23.00
10%	19.50	16%	24.00
11%	20.00	17%	25.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	19.00c
Ferrochromium, 2% carbon	17.00c to 17.50c
Ferrochromium, 1% carbon	19.00c to 20.00c
Ferrochromium, 0.10% carbon	23.50c.
Ferrochromium, 0.06% carbon	25.00c. to 27.00c.
Ferrovanadium, del., per lb. contained Va.	$5.05 to $5.20
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.50
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.85
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68½% iron	9c.
Iron, basic or foundry, Swedish, average 65% iron	8c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	8c.
Manganese, Caucasian, washed 52%	*23c.
Manganese, African, Indian, 50-52%	*21c. to 22c.
Manganese, Brazilian, 46 to 48%	*18c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	$10.00

	Per Gross Ton
Tungsten, domestic scheelite	$8.00 to $10.40
Chrome, 45%, CrsOs, crude, c.i.f. Atlantic seaboard	16.00
Chrome, 48%, CrsOs, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines	$10.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	12.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	$16.00 to 16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	20.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.00 to $9.50
No. 2 heavy melting steel	7.25 to 7.75
No. 2 railroad wrought	9.00 to 9.50
Scrap rails	9.00 to 9.50
Rails 3 ft. and under	10.00 to 10.50
Sheet bar crops, ordinary	9.50 to 10.00
Compressed sheet steel	8.75 to 9.25
Hand bundled sheet steel	7.50 to 8.00
Hvy. steel axle turnings	7.50 to 8.00
Machine shop turnings	6.00 to 6.50
Short shov. steel turnings	6.00 to 6.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
Cast iron carwheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.00 to 10.00
Railr. knuckles and couplers	10.00 to 10.50
Rail. coil and leaf springs	10.00 to 10.50
Rolled steel wheels	10.00 to 10.50
Low phos. billet crops	11.50 to 12.00
Low phos. sheet bar crops	11.50 to 12.00
Low phos. plate scrap	10.50 to 11.00
Low phos. punchings	11.00 to 11.50
Steel car axles	11.00 to 11.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$6.00
Shoveling steel	6.00
Frogs, switches and guards	$6.00
Hydraulic comp. sheets	4.00 to 4.50
Drop forge flashings	4.00 to 4.50
No. 1 busheling	4.00 to 4.50
Rolled carwheels	8.00 to 8.50
Railroad tires	8.00 to 8.50
Railroad leaf springs	8.00 to 8.50
Axle turnings	4.50 to 5.00
Steel couplers and knuckles	7.00 to 7.50
Coil springs	8.50 to 9.00
Axle turnings (elec. fur.)	5.50 to 6.00
Low phos. punchings	8.00 to 8.50
Low phos. plates, 12 in. and under	8.00 to 8.50
Cast iron borings	3.75 to 4.25
Short shoveling turnings	3.75 to 4.25
Machine shop turnings	2.75 to 3.75
Rerolling rails	8.00 to 8.50
Steel rails, less than 3 ft.	8.25 to 8.75
Steel rails, less than 2 ft.	8.75 to 9.25
Angle bars, steel	7.00 to 7.50
Cast iron carwheels	7.00 to 7.50
Railroad malleable	5.50 to 6.00
Agricultural malleable	5.00 to 5.50
* Relaying rails, 56 to 60 lb.	15.00 to 17.00
* Relay rails, 65 lb. and up	18.00 to 23.00

	Per Net Ton
Iron angle and splice bars	$5.00 to $5.50
Iron arch bars, transoms	5.00 to 5.50
Iron car axles	11.00 to 11.50
Steel car axles	8.50 to 9.00
No. 1 railroad wrought	4.50 to 5.00
No. 2 railroad wrought	5.00 to 5.50
No. 1 busheling	2.50 to 3.00

No. 2 bushelling	$2.00 to	$2.50
Locomotive tires, smooth	7.50 to	8.50
Pipe and flues	1.25 to	1.75
No. 1 machinery cast	6.25 to	6.75
Clean automobile cast	6.75 to	7.25
No. 1 railroad cast	5.90 to	6.00
No. 1 agricultural cast	5.75 to	6.25
Stove plate	5.50 to	6.00
Grate bars	5.25 to	5.75
Brake shoes	6.25 to	6.75

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.00 to	$7.50
No. 2 heavy melting steel	5.50 to	6.00
No. 1 railroad wrought	7.50 to	8.00
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	6.00 to	6.50
Hydraulic compressed, old	4.00 to	4.50
Machine shop turnings	3.50 to	4.00
Heavy axle turnings	5.50 to	6.00
Cast borings	3.50 to	3.75
Heavy breakable cast	9.00 to	9.50
Stove plate (steel works)	6.00 to	6.50
No. 1 low phos. heavy	10.00 to	10.50
Couplers and knuckles	8.50 to	9.00
Rolled steel wheels	8.50 to	9.00
No. 1 blast furnace	3.50 to	3.75
Spec. iron and steel pipe	6.50 to	7.00
Shafting	12.00 to	13.00
Steel axles	12.00 to	13.00
No. 1 forge fire	5.50 to	6.00
Cast iron carwheels	9.00 to	9.50
No. 1 cast	9.00 to	9.50
Cast borings (chem.)	8.00 to	10.00
Steel rails for rolling	9.00 to	9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.50 to	$8.00
No. 2 heavy melting steel	7.00 to	7.50
Compressed sheet steel	6.00 to	6.50
Light bundled sheet stampings	4.00 to	4.50
Drop forge flashings	5.25 to	5.75
Machine shop turnings	4.00 to	4.50
Short shoveling turnings	4.50 to	5.00
No. 1 bushelling	5.25 to	5.50
Steel axle turnings	5.00 to	5.50
Low phos., billet crops	10.00 to	11.00
Cast iron borings	4.75 to	5.25
Mixed borings and short turnings	4.75 to	5.25
No. 2 bushelling	4.75 to	5.25
No. 1 cast	7.50 to	8.00
Railroad grate bars	5.00 to	5.50
Stove plate	5.00 to	5.50
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	8.50 to	9.00
Railroad malleable	6.75 to	7.00
Cast iron carwheels		8.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$7.00 to	$7.50
No. 2 heavy melting scrap	6.25 to	6.75
Scrap rails	6.75 to	7.25
New hydraul. comp. sheets	6.25 to	6.75
Old hydraul. comp. sheets		5.00
Drop forge flashings	5.75 to	6.25
No. 1 bushelling	6.25 to	6.75
Hvy. steel axle turnings		6.00
Machine shop turnings	4.00 to	4.50
Knuckles and couplers		10.00
Cold and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet crops	9.00 to	9.50
Short shov. steel turnings	5.50 to	6.00
Short mixed borings and turnings	3.75 to	4.25
Cast iron borings	3.75 to	4.25
No. 2 bushelling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	10.00 to	11.00
No. 1 machinery cast	9.50 to	10.00
No. 1 cupola cast	8.50 to	9.00
Stove plate	6.50 to	7.00
Steel rails, 3 ft. and under	9.25 to	9.75
Cast iron carwheels	8.00 to	9.00
Industrial malleable	7.00 to	7.50
Railroad malleable	7.00 to	7.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.50 to	$8.00
Scrap steel rails	8.00 to	8.50
Short shoveling turnings		4.00
Stove plate		6.00
Steel axles		9.00
Iron axles		9.00
No. 1 railroad wrought	4.50 to	5.00
Rails for rolling	8.00 to	8.50
No. 1 cast		8.50
Tramcar wheels		8.50
Cast iron borings, chem		9.50

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$6.00 to	$6.50
No. 1 heavy melting	5.50 to	6.00
No. 2 heavy melting	5.00 to	5.50
No. 1 locomotive tires	5.00 to	5.50
Misc. stand-sec. rails	6.00 to	6.50
Railroad springs	7.25 to	7.75
Bundled sheets	2.00 to	2.50
No. 2 railroad wrought	5.00 to	5.50
No. 1 bushelling	3.50 to	4.00
Cast iron borings and shoveling turnings	2.75 to	3.25
Iron rails	7.00 to	7.50
Rails for rolling	7.50 to	8.00
Machine shop turnings	2.00 to	2.50
Heavy turnings	3.00 to	3.50
Steel car axles	8.50 to	9.00
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	5.00 to	5.50
No. 1 railroad wrought	3.50 to	4.00
Steel rails less than 3 ft.	7.50 to	8.00
Steel angle bars	6.00 to	6.50
Cast iron carwheels	5.50 to	6.00
No. 1 machinery cast	6.50 to	7.00
Railroad malleable	4.00 to	4.50
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.00 to	6.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 60 lb. and over	20.00 to	21.00
Agricult. malleable	4.00 to	4.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$4.00 to	$4.50
No. 2 heavy melting steel	2.75 to	3.00
Heavy melting steel (yard)		1.50
No. 1 hvy. breakable cast	5.00 to	5.25
Stove plate (steel works)	2.50 to	2.90
Machine shop turnings	0.75 to	1.25
Short shoveling turnings	0.75 to	1.25
Cast borings	0.50 to	1.00
No. 1 blast furnace	0.50 to	1.00
Steel car axles	8.00 to	8.50
Spec. iron and steel pipe	2.50 to	2.75
Forge fire	2.75 to	3.00
No. 1 railroad wrought	4.00 to	4.50
No. 1 yard wrought, long	3.25 to	3.50
Rails for rolling	5.00 to	5.50
No. 1 cast	5.00 to	5.50
No. 2 cast	4.50 to	5.00
Stove plate (foundry)		4.50
Malleable cast (railroad)	4.00 to	4.50
Cast borings (chemical)	6.00 to	6.50
Per gross ton, delivered local foundries:		
No. 1 machinery cast		$9.00
No. 1 hvy. cast (cupola size)	7.50 to	8.00
No. 2 cast	4.00 to	4.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.00 to	$3.25
Scrap T rails	2.50 to	2.75
Machine shop turnings	0.80 to	1.00
Cast iron borings		1.05
Bundled skeleton, long	2.00 to	2.10
Forge flashings	3.00 to	3.50
Blast furnace scrap	0.90 to	1.00
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	4.50 to	5.00
Cast iron borings, chemical	7.00 to	7.25
Per gross ton delivered consumers' yards:		
Textile cast	$7.00 to	$7.50
No. 1 machinery cast	7.50 to	8.00
Stove plate	5.00 to	5.25
Railroad malleable	8.00 to	8.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$6.00 to	$6.50
Scrap rails for melting	6.00 to	6.50
Loose sheet clippings	1.50 to	2.00
Bundled sheets	3.75 to	4.25
Cast iron borings	3.25 to	3.75
Machine shop turnings	3.00 to	3.50
No. 1 bushelling	4.50 to	5.00
No. 2 bushelling	2.75 to	3.25
Rails for rolling	6.50 to	7.00
No. 1 locomotive tires	7.50 to	8.00
Short rails	9.00 to	9.50
Cast iron carwheels	6.50 to	7.00
No. 1 machinery cast	8.25 to	8.75
No. 1 railroad cast	7.75 to	8.25
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Agricultural malleable	7.75 to	8.25
Railroad malleable	8.25 to	8.75

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$5.50 to	$6.00
Borings and short turnings	3.50 to	4.00
Long turnings	2.75 to	3.25
No. 1 machinery cast	7.75 to	8.25
Automotive cast	8.00 to	8.50
Hydraul. comp. sheets	5.25 to	5.75
Stove plate	3.75 to	4.25
New No. 1 bushelling	4.75 to	5.25
Old No. 2 bushelling	3.50 to	3.90
Sheet clippings	2.00 to	2.50
Flashings	4.00 to	4.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$8.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	3.00	3.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels	10.00	8.00
Malleable	10.00	8.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	3.45c.
Hoops and bands, under ⅛ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. currug. sheets (No. 28), per square (less than 3750 lb.)	$3.74
Spikes, large	2.50c.
Small	2.75c. to 2.95c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	70 per cent off list
Machine bolts, 100 count,	70 per cent off list
Carriage bolts, 100 count,	70 per cent off list
Nuts, all styles, 100 count,	70 per cent off list
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.75
Wire, galv. soft, base per 100 lb.	3.20
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.35

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per Lb.

Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel, 1.35c. to	1.50c.
Rail steel reinforcement, 1.15c. to	1.25c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, ¼ in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 22)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (½ in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	3.75c.
Rivets, boiler	3.75c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Coach and lag screws	70
Hot-pressed nuts, sq., tap. or blank	70
Hot-pressed nuts, hex., tap. or blank	70
Hex. head cap screws	80 and 10
Cup point set screws	75 and 10
Flat head bright wood screws	52½ and 10
Spring cotters	60
Stove bolts	80
Bd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

NEW YORK

Base per Lb.

Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	6.50c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.39c.
Flats and squares	3.89c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	3.00c.
Hot-rolled ann'l'd sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.90c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel, ⅜ x ⅛ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.60
	Per Cent
Machine bolts, cut thread:	Off List
⅝ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
	Per Cent Off List
Tank rivets, ⅞ in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	70
Less than 200 lb.	60

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.10c.
*Structural shapes	2.10c.
*Soft steel bars, small shapes, iron bars (except bands)	2.10c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-fin. steel rounds and hex.	3.35c.
Cold-fin. steel, sq. and flats	3.85c.
*Steel hoops	2.65c.
*Steel bands, No. 13 to 3/16 in., incl.	2.40c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	3.75c.
*Hot-rolled and annealed sheets (No. 10)	2.55c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices for 15,000-lb. orders; extra apply for smaller quantities.

CLEVELAND

Base per Lb.

Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex.	2.95c.
Cold-fin. flats and sq.	3.45c.
Flat rolled steel under ⅛ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb.	$2.75
No. 9 galv. wire, per 100 lb.	3.20
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rails steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.30c.
Cold-fin. rounds and hex.	3.35c.
Squares and flats	3.85c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot rolled sheets (No. 10)	3.90c.
Structural rivets	4.10c.
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 3-in.	16.50
4-in.	34.50

BUFFALO

Base per Lb.

Plates and struc. shapes	2.90c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.50c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	6.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.05c.
Bands	3.30c.
Hoops	3.95c.
Hot-rolled sheets (No. 10)	3.45c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.25

BOSTON

Per Lb.

*Beams, channels, angles, tees, zees	3.00c.
*H beams and shapes	3.00c.
*Plates—sheared, tank, and univ. mill, ¼ in. thick and heavier	3.00c.
Floor plates, diamond pattern	5.25c.
*Bar and bar shapes (mild steel)	2.90c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.40c.
Hoops, No. 14 ga. and lighter	4.00c. to 5.40c.
*Half rounds, hf. ovals, ovals and bevels	4.15c.
Tire steel, rd. edge 1⅛ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	6.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets No. 16 ga.	3.15c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets No. 24 ga.	3.90c.
Galvanized steel sheets No. 24 ga.	4.00c.
Lead coated (long terne) No. 24 ga.	5.00c.

*Base prices for 15,000 lb. orders, extras apply for smaller quantities.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¼-in. and heavier	3.15c.	3.50c.	3.00c.
Soft steel bars	3.15c.	3.50c.	3.00c.
Reinforcing bars	3.00c.	3.00c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.20c.	4.50c.
Hot rolled sheets (No. 10)	3.375c.	3.50c.	4.00c.
Galv. sheets (No. 24)	4.55c.	4.50c.	5.00c.
*Struc. rivets, ½ in. and larger, less than 1000 lbs.	5.75c.	5.00c.	4.00c.
*Cold finished steel Rounds	5.50c.	5.50c.	4.50c.
Squares and hexagons	6.75c.	6.75c.	5.75c.
Flats	7.25c.	7.25c.	6.75c.
Common wire nails, base per keg in less carloads	$2.90	$2.90	$3.00

*Subject to deductions for quantity.

Machine Tool Trade Marking Time

Pre-Election Lull Is Expected to Be Followed by Release of Pending Business

WHILE machine tool buying has been held back pending the outcome of the Presidential election, inquiries have increased and there seems to be every prospect that the improvement in business which got under way in October will shortly be resumed. A potential demand of considerable proportions is developing among manufacturers who are preparing to put new products on the market. Likewise, sizeable orders from the automobile industry are expected to be placed soon.

Current business has been limited mainly to purchases of repair parts and single machines. Cincinnati reports that motor car manufacturers continue to be the chief source of orders, although not yet buying in quantity. A maker of low-priced automobiles has purchased two crankshaft lathes, making a total of five bought in the past two months.

Although dealers have found the past week dull, some of them made very good showings in October. A leading Eastern machinery house booked the largest month's business since April.

NORTH ATLANTIC

Department of Sanitation, Municipal Building, New York, will soon ask new bids for three municipal incinerator plants, one on 216th Street, Manhattan, one on Zerega Avenue, Bronx, and third at Douglaston, Queens. Units will include power stations, unloading, conveying and other mechanical-handling equipment. Cost about $700,000 each with equipment. It is proposed to build fourth such unit in another part of city later.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Nov. 16 for improvements in 15 buildings at Naval Ammunition Depot, Iona Island, N. Y. (Specification 6534).

Vaporedair Corpn., New York, has been organized by George and Charles Newman, 203 West Fifty-fourth Street, and Nathaniel B. Wales, 145 West Fifty-fifth Street, to manufacture air-conditioning equipment and parts.

Manhattan Radiator Mfg. Co., Brooklyn, has been organized by Hyman Kaplan, 1028 New York Avenue, and associates, to manufacture automobile radiators and equipment.

Hoboken Manufacturers Railroad Co., Fifth Street and River Road, Hoboken, N. J., has secured permission to arrange financing in amount of $320,000 of which $150,000 will be used for extensions and improvements in terminal facilities, with installation of mechanical-handling and other equipment.

Art Tube Co., 8 Renee Place, Irvington, N. J., manufacturer of flexible metallic tubing, is running on a capacity schedule with full working quotas.

Kraissl Co., Inc., Hackensack, N. J., has been organized by Frederick Kraissl, Jr., Kinderkamack Road, North Hackensack, and associates to manufacture pumping machinery and parts.

Atlantic City Electric Co., Atlantic City, N. J., has authorized installation of an underground conduit system for power lines to cost about $600,000, work to begin in about 30 days.

Trojan Appliance Co., Inc., Troy, N. Y., has been organized by Seth R. Stockholm, 523 Sixth Avenue, Troy, and Seth Lee, 395 Manning Boulevard, Albany, N. Y., to manufacture oil burning equipment and devices.

Lehigh Portland Cement Co., Allentown, Pa., has resumed operations at mill at New Castle, Pa., following shut down for several weeks, reinstating about 200 men.

Central Forging Co., Catawissa, Pa., manufacturer of pipe unions and other forgings, plans rebuilding part of plant recently destroyed by fire. Loss over $50,000 with equipment.

T. Warren Metzger, mayor, Municipal Building, Lancaster, Pa., asks bids until Nov. 21 for pumping machinery and other equipment for a sewage treatment plant. J. N. Chester Engineers, Inc., 717 Liberty Avenue, Pittsburgh, is consulting engineer.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Joseph H. Hagedorn, director, asks bids until Nov. 15 for corrugated metal pipe (Class 269), metal street signs (Class 270), pipe fittings (Class 274).

Taylor & Co., Inc., Provident Trust Building, Philadelphia, has begun erection of new plant on 43-acre tract at Betzwood, near Philadelphia, for manufacture of vulcanized fiber products, to include powerhouse and other mechanical units. Plant will aproximate 60,000 sq. ft. floor space. Cost over $125,000 with machinery.

Hetzler Foundries, Inc., Rochester, N. Y., has been organized by George A. Hetzler, 30 Seyle Terrace, Rochester, and Herman Hetzler, Livonia, N. Y., capital $50,000, to manufacture iron and other metal castings.

Carthage Paper Makers, Inc., Carthage, N. Y., recently organized, will take over local mill of Carthage Pulp & Board Co., closed for about two years, for manufacture of paperboard products, including container board, tag board, etc.

Tarbox Lever Corpn., Buffalo, has been formed by John S. O'Donnell, 1290 Delaware Avenue, and Edward J. Sullivan, 412 West Delavan Avenue, to manufacture iron levers for mop wringers and other mechanical appliances.

Wanakah Water Co., Hamburg, N. Y., plans installation of a 250,000-gal. capacity steel tank, hydrants and other mechanical equipment, in connection with extensions and improvements in water system. Fund of $70,000 is being arranged for project.

Skaneateles Boat & Canoe Co., Inc., Skaneateles, N. Y., has been organized by Walter L. Cavell, Skaneateles National Bank & Trust Co. Building, Skaneateles, and John S. Barnes, 322 Farmer Street, Syracuse, N. Y., to operate a boat-building and repair plant.

SOUTH ATLANTIC

Sylvania Industrial Corpn., Fredericksburg, Va., manufacturer of transparent cellulose wrapping materials, let general contract to Hughes-Foulkrod Co., Schaff Building, Philadelphia, for two one-story additions. Cost about $130,000 with equipment. Headquarters of company are at 122 East Forty-second Street, New York. Ballinger Co., Twelfth and Chestnut Streets, Philadelphia, is architect.

United States Coast Guard Headquarters, Washington, asks bids until Dec. 1 for 10,000 ft. wire rope, size No. 6.

United States Construction Engineer, 812 Southern Railway Building, Atlanta, Ga., asks bids until Nov. 18 for one platform beam scale, for post office.

Clyde-Mallory Steamship Lines, Jacksonville, Fla., has approved plans for one-story precooling plant at terminal, Tampa, Fla. Cost close to $60,000 with equipment. Headquarters are at Pier 36, North River, New York.

Commissioner of Lighthouses, Washington, asks bids until Nov. 29 for construction of steel lighthouse tender, steam-propelled, with machinery and equipment, 173 ft. long, 1000-hp.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Nov. 15 for one motor-driven abrasive cut-off machine (Schedule 9034), one heat-treating electric furnace (Schedule 9047), 50 gun charging controls and 100 gun charging handles (Schedule 9024), one electric dynamometer (Schedule 9054), all for Philadelphia Navy Yard; one electric molder machine (Schedule 9042), one motor-driven engine lathe (Schedule 9035) for Norfolk, Va., Navy Yard; one wood boring machine, motor-driven (Schedule 9053), one motor-driven pipe-bending machine (Schedule 9070) for Brooklyn Navy Yard; one motor-driven precision lathe (Schedule 9036), motor-driven inclinable press (Schedule 8925); until Nov. 22, six motor generator sets and spare parts (Schedule 9026), lighting and power cable (Schedule 9045), hoisting equipment, control units and spare parts (Schedule 9075), 71 gear flotation bags (Schedule 9023) all for Eastern and Western Yards.

United States Engineer Office, Jacksonville, Fla., asks bids until Nov. 14 for one 70-ft. steel barge (Circular 175).

SOUTHWEST

Ozark Chemical Co., Cosden Building, Tulsa, Okla., will begin work this month on new plant for production of sodium sulphate at Soda Lake, near Monahans, Tex., where large tract has been secured. Project will include powerhouse and pumping plant. Cost over $150,000 with machinery.

Butters Pump & Equipment Co., Kansas City, Mo., has been organized by Roy W. Butters and George H. Charno, to take over and expand company of same name, Dierks Building, manufacturer of pumping machinery and kindred equipment.

Lee Chain Co., Jefferson City, Mo., manufacturer of skid chains, plans rebuilding part of plant recently destroyed by fire. Loss close to $40,000 with equipment.

Missouri Signal Co., Harrisonville, Mo., has been organized by A. J. Nichols, 218 Clayton Building, Sapulpa, Okla., and associates to manufacture signal equipment and devices.

Circle Packing Corpn., East St. Louis, Ill., meat packer, has asked bids on general contract for two-story and basement addition, 56 x 65 ft. Cost about $35,000 with equipment. Bonnell-Tohtze Co., 1515 North Grand Boulevard, St. Louis, is architect.

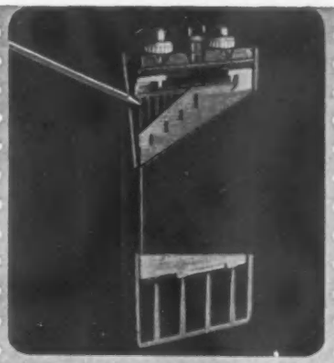
Wackman Welded Wire Co., 2412 South Seventh Street, St. Louis, manufacturer of steel barrels, drums and other welded products, has begun installation of equipment in building formerly occupied by Stern Foundry Co., Richard and Annunciation Streets, New Orleans, for branch plant. Unit will be used primarily for production of steel barrels.

The camera tells WHY!

See why the Exide-Ironclad Battery costs so little to operate —lasts so long

Find out today more about this Exide-Ironclad Battery for Industrial Trucks . . . how it can save you real dollars.

Exide
IRONCLAD
BATTERIES

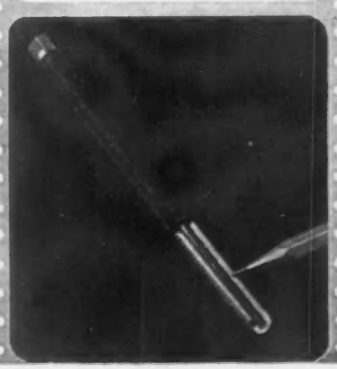


HERE YOU SEE an Exide-Ironclad cell, cut away to show its unique construction. A construction different from that of any other battery made. Not made different just to be different, but a construction that assures low operating costs and a long, active life of absolute dependability in every type of industrial truck service. The pencil points to the positive plate of the Ironclad cell.

ONE OF THE REASONS for the long, economical life of the Exide-Ironclad Battery—the positive plate. Close inspection reveals a series of cylinders or tubes. These tubes are of hard rubber, ribbed front and back and horizontally slotted for their entire length. Tubes are filled with active material.

A CLOSE-UP of one of the slotted tubes of which the positive plate is composed. Immersed in liquid it shows how the electrolyte meets the active material imprisoned within the tube, through the slots in the tube; but cannot wash it away. This means sustained power over an unusually long life in the toughest industrial truck service, plus economy of operation. Many letters in our files from users testify to this (copies on request).

THE SLOTTED RUBBER TUBE cut away to show the active material within. Also conducting core rod running through the centre of the tube. The cylindrical construction of the tubes of the positive plate resists distortion because of the fact that expansion and contraction is equal in all directions.



THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

City Council, Conway, Ark., E. V. Leverett, superintendent, municipal power plant, contemplates early call for bids for extensions and improvements in power station, including purchase of 750-hp. Diesel engine generator unit and accessories. Cost close to $50,000.

Contracting Officer, Quartermaster Corps, Fort Riley, Kan., asks bids until Nov. 15, for wrenches, tools, hardware, electric supplies, wire cloth, steamfitters' supplies, gas fitting equipment, welding flux, etc. (Circular 14).

CENTRAL DISTRICT

American Barge Line Co., House Building, Pittsburgh, plans one-story storage and distributing building, about 10,000 sq. ft. floor space, at river and rail terminal, Glassport, Pa. Cost about $30,000 with loading and other equipment.

Owens-Illinois Glass Co., 965 Wall Street, Toledo, Ohio, has awarded general contract to Simplex Construction Co., Washington, Pa., for two one-story additions to branch plant at Clarion, Pa., for storage and distribution. Cost about $70,000 with equipment.

Aetna-Standard Engineering Co., Youngstown, Ohio, manufacturer of heavy machinery, is advancing production schedule at works at Ellwood City, Pa., where operations are now being concentrated. October business was highest for any month this year.

American Zinc Oxide Co., 1362 Windsor Avenue, Columbus, Ohio, has asked bids on general contract for three one-story additions; one unit, 75 x 80 ft., for factory service, and two buildings, each 20 x 75 ft., for storage and distribution. Cost over $65,000 with equipment. Company is a subsidiary of American Zinc, Lead & Smelting Co., 1 State Street, Boston.

City Council, Utilities Committee, City Hall, Cleveland, has authorized purchase of new electric meters. Cost about $20,000. A. R. Brueggeman, utilities director, in charge.

City Board of Purchase, City Hall, Columbus, Ohio, D. C. Westenhaven, secretary, has rejected bids recently received for a 10,000-lb. roll-on type air lift with air compressor and accessory equipment, for installation in North Market House. New bids will be asked soon.

City Council, Galion, Ohio, is having surveys made for extensions and improvements in municipal electric light and powerplant, including additional equipment. Cost over $125,000. Hadlow, Hughes, Hicks & Conrad, Citizens Building, Cleveland, are consulting engineers.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until Nov. 14 for 40 fuel coolers (Circular 202); until Nov. 16, 10, 350 lb. iron welding rods, 2200 lb. steel welding rods (Circular 193), 2034 lb. chrome nickel sheet steel (Circular 207); until Nov. 21, two motor-driven precision bench lathes (Circular 185), chrome molybdenum seamless steel tubing (Circular 192); until Nov. 22, 2500 ft. flexible steel tubing (Circular 206), fiber rods, fiber sheets, etc. (Circular 201), 75,000 lb. galvanized sheet iron and 3376 lb. black sheet iron (Circular 199), fuel and oil hose, and cooling liquid hose (Circular 204); until Nov. 28, 10 65-gal. cylindrical tanks (Circular 208).

Reflector Corpn., Toledo, Ohio, has been organized by L. R. Ayers and Ralph M. Netz, care of Boggs & Chase, Nicholas Building, representative, to manufacture lighting reflectors and kindred products.

Mount Vernon Milling Co., Mount Vernon, Ind., plans rebuilding corn products plant recently destroyed by fire. Loss over $100,000 with equipment.

Universal Atlas Cement Co., Chicago, has reopened mill at Buffington, Ind., following shut-down for several months, recalling over 500 men.

Department of Public Works, City Hall, Detroit, L. G. Lenhardt, commissioner, will soon take bids for new municipal refuse incinerator plant. Cost over $1,500,000 with equipment.

Kelvinator Corpn., 14250 Plymouth Street, Detroit, manufacturer of electric refrigerators, has increased working force. Company has adopted five-day week.

Reynolds Spring Co., Jackson, Mich., manufacturer of automobile springs, will carry out expansion for manufacture of composition products, including installation of 25 300-ton presses and auxiliary equipment. Present capacity will be more than tripled. Cost over $100,000 with machinery.

Hudson Mfg. Co., Detroit, has been organized by William H. Hudson, 16845 Huntington Avenue, and associates, to manufacture tools and machine specialties.

Gibson Electric Refrigerator Co., Greenville, Mich., will carry out expansion and improvements, including removal of absorption division from Greenville to branch plant at Belding, Mich., utilizing space vacated at first noted factory. Company will also develop higher production facilities at Belding plant.

Cyclone Fence Co., Tecumseh, Mich., manufacturer of metal fencing, wire screen cloth, etc., has reopened its plant, following curtailment for several months.

Welch Tool & Mfg. Co., Detroit, has been organized by Rodney R. Welch and associates to take over Welch Tool Co., 4723 Sixteenth Street, manufacturer of tools and other mechanical specialties.

Welded Steel Barrel Corpn., Detroit, has been organized by Thomas B. Colby, 211 Leib Street, and associates to manufacture welded steel tanks, barrels and kindred containers.

NEW ENGLAND

Amesbury Metal Products Co., Amesbury, Mass., recently organized by John J. O'Brien, Amesbury, and associates, has taken over plant and business of Aga Auto Lamp Co., Oakland Street, manufacturer of automobile lighting equipment, etc., and will operate as unit.

Sure Way Refiller Corpn., Middletown, Conn., has been organized by Frank and Alexander Saraceno, both of Middletown, to manufacture liquid fuel burners, pumping equipment and kindred machinery.

Superintendent of Lighthouses, Portland, Me., asks bids (closing date not stated) for two-story shop building, 40 x 100 ft.

Dualvalve Oil Burner Corpn., Boston, has been organized by H. Russell Davis and Edward H. Temple, Jr., 101 School Street, Belmont, Mass., to manufacture oil burners and oil-burning devices.

Raybestos-Manhattan, Inc., Bostwick Avenue, Bridgeport, Conn., manufacturer of brake lining, etc., operating Canadian Raybestos Co., Peterborough, Ont., has awarded general contract to T. A. Brown Co., Ltd., 1121 Bay Street, Toronto, for one-story addition to last noted plant. Cost about $45,000 with equipment.

MIDDLE WEST

Specialty Tool Mfg. Co., Inc., Carlyle Road, Belleville, Ill., has been organized by Severin N. Frederick, Belleville, and associates, to manufacture tools and other mechanical equipment.

Superintendent of Lighthouses, Federal Building, Milwaukee, plans early call for bids for electric and oil engine-operated air compressors for lighthouse stations in Michigan.

Bureau of Reclamation, Denver, and Ontario, Ore., asks bids until Nov. 22 for tunnel controlling works, Ogyhee Project, Oregon-Idaho, vicinity of Nyssa, Ore., including gate hoists, 791,000 lb. metal gates, 363,000 lb., and other equipment (Specification 539).

South Omaha Packing Co., 4734 South Twenty-seventh Street, South Omaha, Neb., has awarded general contract to Cooper Construction Co., 4610 Douglas Street, for one-story addition to meat-packing plant, 60 x 80 ft.

Central Broadcasting Co., Des Moines and Davenport, Iowa, operating stations WOC and WHO, has awarded general contract to Kucharo Construction Co., Hubbell Building, Des Moines, for two-story broadcasting station, 38 x 68 ft., at Mitchellville, Iowa, to cost about $40,000 with power station, towers and other equipment.

Minneapolis-Honeywell Regulator Co., Fourth Avenue South, Minneapolis, Minn., manufacturer of oil and gas burners, heating and ventilating equipment, is running on a capacity schedule, with full working quotas.

Continental Cushion Spring Co., 4925 South Halsted Street, Chicago, manufacturer of steel springs, etc., has increased operating schedule each month during past four months, adding to working force.

Western Radiator Co., Room 1529, 31 South State Street, Chicago, has been organized by Phillip Schneider and David Wiener to manufacture automobile radiators and other sheet metal products.

Chandler Pump Co., Cedar Rapids, Iowa, manufacturer of pumps, boilers and kindred equipment, has reopened its foundry and machine shops, following shut-down for several months.

City Council, Canton, S. D., is considering report submitted by Buell & Winter Engineering Co., Insurance Exchange Building, Sioux City, Iowa, consulting engineer, recommending erection of a municipal electric light and power plant. Cost about $115,000 with equipment.

SOUTH CENTRAL

United States Engineer Office, Louisville, will soon ask bids for new lock and dam No. 5, Green River, near Bowling Green, Ky. Appropriation of $970,000 has been authorized for work, including power and operating machinery, etc.

City Council, Bowling Green, Ky., plans installation of pumping machinery and other equipment in connection with installation of new municipal sewage system. Fund of $630,000 has been secured for project.

Common Council, Crystal Springs, Miss., is considering erection of a municipal electric light and powerplant. Cost over $40,000 with equipment.

Louisville & Nashville Railroad Co., Louisville, and City Council, Birmingham, acting jointly, have awarded general contract to Foster-Creighton Co., American Bank Building, Nashville, Tenn., for two-story storage and distributing plant, 80 x 200 ft., at Birmingham. Cost about $100,000 with conveying and other equipment. Edward Wise, Jr., Louisville, is engineer for railroad.

Common Council, Greenwood, Miss., plans installation of pumping machinery and auxiliary equipment for surface water in connection with new flood protection system. Cost reported over $65,000.

PACIFIC COAST

City Purchasing Agent, Thomas Oughton, City Hall, Los Angeles, asks bids until Nov. 29 for one steam generating unit and auxiliary equipment, to operate a 65,000-kw. electric generator, for which bids will be received at same time, equipment to be installed at new municipal electric light and power plant at Wilmington Harbor (Specifications 2932 and 2933, respectively).

Board of City Trustees, Long Beach, Cal., is considering erection of four-story precooling plant near Pier B, for handling 150 carloads of freight daily. Cost about $175,000 with machinery. Project will be carried out in connection with general harbor expansion and improvements, for which bond issue of $3,400,000 is being arranged.

Vulcan Casting Corpn., Los Angeles, care of Leo Freund, 806 Garfield Building, representative, has been organized by William A. DeSantis and J. L. Spence, both of Los Angeles, to manufacture iron and other metal castings.

Construction Service, Veterans' Administration, Washington, asks bids until Dec. 20 for new buildings and utilities at institution at San Francisco, including boiler plant equipment, steel stack, electric and hydraulic elevators, refrigerating and ice-making machinery, steam and electric distribution systems, platform scales, etc.

Metropolitan Water District, 306 West Third Street, Los Angeles, J. M. Gaylord, chief electrical engineer, asks bids until Nov. 17 for 15 2000-kva., 45 333-kva. and 24 250-kva. electrical transformers; five 5000-kva. condensers with auto transformers for starting; 77 oil circuit breakers for capacity from 69,000 to 7500-volts.

Superior Lime & Mining Co., Wenatchee, Wash., is planning expansion and improvement, including new lime kilns and installation of equipment. Cost over $90,000.

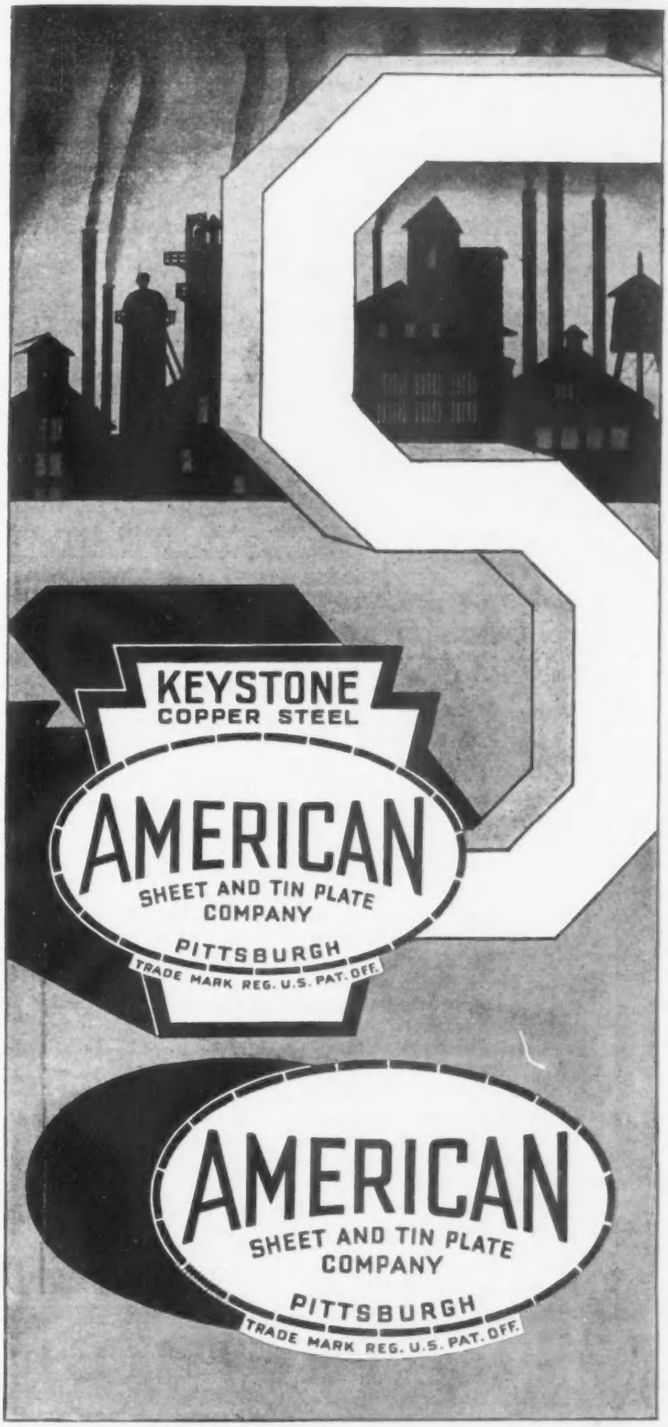
Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 22 for following motor-driven equipment: two band saws (Schedule 9044) for San Diego Navy Yard; turret lathe (Schedule 9040) and three tool-makers' precision lathes (Schedule 9039) for San Pedro, Los Angeles, Navy Yard; three engine lathes (Schedule 9046) for Mare Island Navy Yard; one shaper (Schedule 9051) for Mountain View, Cal., yard.

FOREIGN

Secretary, Posts and Telegraph Department, Melbourne, Australia, is asking bids until Dec. 20 for quantity of lead-covered multiple twin cable.

Associated Boards of Trade of Fraser Valley, New Westminster, B. C., are interested in a proposition tendered by a company in England, name temporarily withheld, to erect a new beet sugar mill in Fraser Valley district. Plant will cost close to $500,000, of which about $350,000 will be expended for machinery.

Precision Mechanics Trust of Soviet Russian Government, Moscow, has approved erection of new plant at Kiev, for manufacture of precision instruments and equipment, including X-ray apparatus. Initial unit to cost over $100,000. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.



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Pacific Coast Distributors—Columbia Steel Company, San Francisco, Calif.
Export Distributors—United States Steel Products Company, New York, N. Y.

Deep Drawing of Rustless Steels

(*Concluded from Page 727*)

of many years. The values for iron, brass, copper and aluminum are shown in comparison with the rustless steels. From the latter the most widely used compositions have been considered, two varieties of the straight chromium or rustless iron type, one with 12 to 14 per cent chromium and the other with 17 to 20 per cent chromium, a carbon content around 0.10 per cent and the remainder chiefly iron; and the well known 18 and 8 composition containing from 17 to 20 per cent chromium, around 0.10 per cent carbon or less, and 7 to 10 per cent nickel, with the remainder iron. In using the table it must be understood that these figures are averages, which require careful consideration of all the factors which are discussed later and which have a particular significance in drawing rustless steels.

Values of m for Various Materials

	First Draw		Subsequent Draws	
	Lighter Than 14-Gage	Heavier Than 14-Gage	Lighter Than 14-Gage	Heavier Than 14-Gage
Material	*m*	*m*	*m*	*m*
Ingot iron	0.60	0.60	0.80	0.83
Brass, copper	0.50	0.52	0.76	0.76
Aluminum	0.58	0.58	0.80	0.83
12-14% chromium	0.58	0.58	0.80	0.83
17-20% chromium	0.62	0.62	0.78	0.78
18 and 8 (Cr and Ni)	0.52	0.54	0.82	0.84

It will be noted from the table that the various rustless steels behave quite differently from the metals with which the plant engineer is familiar. The 18 and 8 rustless steel shows a drawability very close to that of copper and brass for the first draw, but this falls off considerably for any subsequent drawing operation without intermediate annealing. This is due to the extreme work hardening of this grade of rustless material in any kind of cold deformation. On the other hand, the straight 17 to 20 per cent chromium grade shows a poor reduction for the first draw, but a very satisfactory percentage for redrawing operations, again entirely contrary to the experience with other metals.

Other Methods of Calculating

Another method of obtaining the value *m*, when there are more than two drawing operations without any intermediate annealing, is found in the following equations:

$$m = 0.56 + 0.50\,D$$
$$m = 0.70 + 0.63\,d$$
$$m = 0.80 + 0.63\,d_1$$

These equations, which are the result of many years of extensive experiments by Musiol, show that for a second redrawing operation the reduction should be still smaller, provided the material has been stressed to its full limit in the first two draws.

Still another method has been very useful in designing dies for drawing rustless steels and permits quick interpretation by representing the equations graphically, as shown in Figs. 3 and 4. These equations have the advantage that they give more accurate results, because they take the thickness of the material into consideration:

$$(1)\qquad d = \frac{XD}{100 - 0.625\,D}$$

$$(2)\qquad d_1 = \frac{X_1 d}{100 - 0.625\,d}$$

whereby the values for X and X_1 are:

Thickness in In.	X Min.	X Max.	X_1 Min.	X_1 Max.
0.016	61	68	74	81
0.020	58	65	73	80
0.025	56	63	72	80
0.028	54	60	71	79
0.032	50	56	70½	77
0.062	47	53	70	75
0.125	51	51	65	65

In applying these values for X and X_1 properly to rustless steels it has been found that reliable results are obtained in applying, for the 18 and 8 composition, the minimum values for X for the first draw and the maximum values of X_1 for any subsequent draw. For the 17-20 per cent straight chromium type the maximum values for X for the first draw are entirely safe to use and for any redraws the minimum values for X_1 should be increased by about 5 per cent.

In Fig. 3 the equations have been plotted for a material having a thickness of about 24 U.S. standard gage for the 18 and 8 or chromium-nickel rustless steel and in Fig. 4 the same thing has been done for a thickness of about 24 U.S. standard gage for the 17 to 20 per cent straight chromium rustless material. Comparison of the two charts furnishes valuable information as to the behavior of these two grades of rustless steel and demonstrates that the plant engineer should not attempt to guess in any way the steps in which this material can be drawn.

In Fig. 3 the lines are drawn for the drawing of a blank of 14 in. in one draw and two redraws using 18 and 8 rustless steel. The first step allows a possible reduction to 8½ in., the first redraw to 6⅝ in. and the subsequent redraw to 5 15/16 in. These three draws can be performed without an intermediate anneal.

In Fig. 4 the same size of blank diameter, 14 in., has been taken and a first draw and two redraws laid out for the straight chromium type. The diameter of the shape after these operations is approximately the same, that is 6 1/16 in. or only ⅛ in. larger. The steps to achieve this result are entirely different, however, for the straight chromium rustless steel from those for the 18 and 8 grade. In the first draw the material is reduced only to 9½ in. but the subsequent reduction in the two redraws is correspondingly larger, from 9½ in. to 7⅝ in., and from 7⅝ in. to 6 1/16 in.

It is obvious that a set of dies which has been designed and used for one grade of these two rustless steels cannot be applied to the other grade without causing excessive breakage and other troubles. The writer knows of several cases where one of these two grades had been successfully used and then for some reason a change to the other type of rustless steel was considered. The steel company furnishing the material stated that this type could be cold drawn, say from 14 in. to 6 in. in three steps without intermediate annealing. The same dies were used and the trial ended with complete failure, which nobody seemed to be able to explain at the time since the diameter of the blank and the diameter of the finished shape were in both cases the same.

As can easily be seen from Figs. 3 and 4, in one instance the first draw overstrains the straight chromium material on dies laid out for the 18 and 8 grade and in the other case the subsequent draws are too much for the 18 and 8 material in a set of dies designed for the straight chromium rustless steel. There are so many variables in the drawing process that any formula of this kind should be carefully scrutinized. This is especially important for the rustless steels.

The problems of the proper selection of the raw material for the drawing dies, the radii of the drawing edge and the punch, the air space between punch and die, the lubricant and its application and the types of drawing presses most suitable for drawing rustless steels make it mandatory for the engineer confronted with these problems to have some knowledge of the theory of the deep-drawing process and its practical application for drawing rustless steels.

J. A. Fay & Egan Co., Cincinnati, woodworking machinery manufacturer, has experienced a decided increase in number of inquiries that it is receiving and a pick-up in orders for machine repairs and supplies, according to R. W. Egan, president. Recent orders, which included two of the largest orders of their kind ever received by the company, will engage some departments of the plant for several months.

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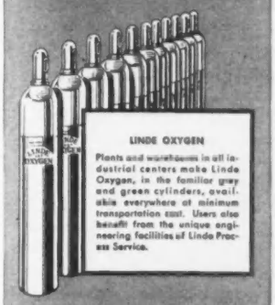

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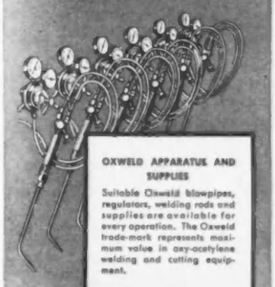

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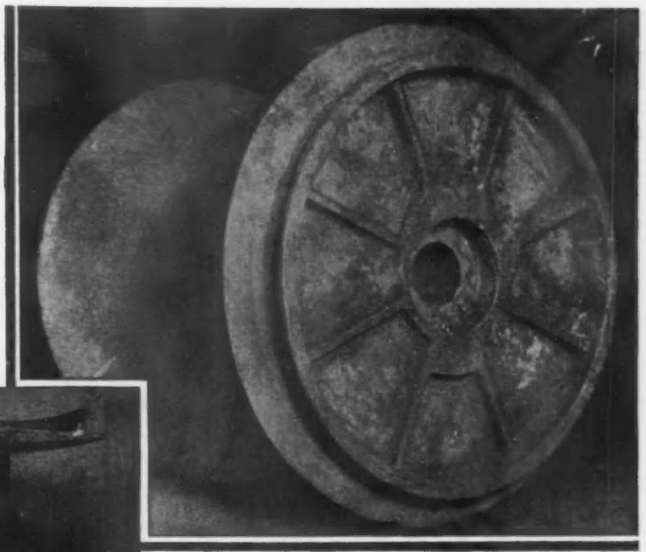

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Liquid Baths for Heat Treating—Medium-Temperature Salt Baths

(*Concluded from Page 721*)

other than desirable salts. Hence, I see no reason for using barium chloride.

Bath Containers

None of the above medium-temperature mixtures gives satisfactory results in clay or graphite pots, and the ordinary heat-resisting alloys, containing chromium, do not last when used as containers for these baths. For medium and high temperatures, thin-walled containers of as good a heat-conducting material as possible are desirable from the standpoint of furnace efficiency, and wrought metals are, of course, more likely to be free from harmful defects than are castings.

I have obtained best results in the medium-temperature range with pressed steel pots whose surfaces have been impregnated with aluminum. Toward the lower end of this range—say below 1400 deg. F. (760 deg. C.)—a plain seamless pressed steel pot will stand up surprisingly in a well designed furnace which applies heat evenly to all portions of the pot.

Four Groups of Mixtures

With these thoughts in mind, let us briefly consider the various medium-temperature mixtures, which may be divided into four groups.

I.—*Chloride Mixtures Containing Calcium:* There is not much choice between IX and X; probably the latter is slightly cheaper. They are good for tempering steels requiring temperatures from 1000 deg. F. (540 deg. C.) upward, but their use should be limited, I believe, to cases where this work must be handled in one bath. If two baths can be used, one of the low-temperature salts will serve up to 1100 deg. F. (593 deg. C.) and XII or XIII may be used for the higher temperatures; XI melts a little higher than IX or X, but XI is slightly preferable, if applicable, because of its lower calcium chloride content, though it is a little more expensive than IX or X.

II.—*Chloride-Carbonate Mixtures:* XII and XIII are the lowest melting cheap mixtures available in the medium-temperature range which do not contain calcium chloride. These mixtures, and XIV and XV, all have similar characteristics, and may be used for either drawing or hardening, although they are not as good at higher temperatures as the mixtures in the fourth group, to be discussed later. I believe XIV to be preferable to the other three chloride-carbonate mixtures, although in any specific case we must consider melting point, which favors XII and XIII, and cost, which favors XV.

III.—*Chloride Mixtures Containing Barium:* I prefer to class XVI by itself, as a chloride mixture containing barium. Its use would be indicated only when it is necessary to cover its entire temperature range with a single bath. It melts lower than the following chloride mixtures, and can safely be used a little higher than the chloride-carbonate mixtures. The effects of carbonates will be discussed more fully later.

IV.—*Alkali Chloride Mixtures:* We then come to the true "hardening salts"—the chloride mixtures containing neither calcium nor barium. These mixtures are unquestionably the best above 1300 deg. in the medium-temperature range. They are more nearly neutral to steel and other metals at these temperatures than are other types of salt mixtures, though, as we shall see, they are not perfectly inert. They clean easily with any washing method, being removed simultaneously with oil in alkaline washing solutions. They do not cause appreciable rusting of work subsequent to its being heated therein, nor do their fumes noticeably corrode metals in the vicinity of the furnace. All salt baths, at red heats and above, fume to some extent, the amount being dependent chiefly upon the temperature.

Decarburizing Action

These alkali chloride mixtures may be used up to 1650 deg. and possibly at higher temperatures for short periods, although decomposition of the bath is hastened, pot life is shortened, and inertness of the salts to metals is diminished, as operating temperature is increased. Carbonates tend to decarburize steel at the higher temperatures; this is the principal reason for preferring the straight chloride mixtures to the chloride-carbonate combinations. On the other hand, chlorides, after some use, especially at higher temperatures, oxidize to oxides or carbonates; with the straight chloride mixtures to start with, this change in composition is not serious except when being used for work the surface condition of which is important, or for large work requiring long heats.

(*To be continued*)

Test Results and Service Value of Materials—II

(*Concluded from Page 725*)

other proposed new test: "Do not use the test unless it seems to give results closely correlated with the service required."

Creep Limit of Metals

The second new limit, newer even than the fatigue limit, is the creep limit. At elevated temperatures for ordinary metals (and for room temperatures for lead) under a steady load there goes on a continuing stretch or compression of the metal. This is different from the plastic flow which takes place at the yield point, for such plastic flow does not continue indefinitely under steady load. Whether for any metal there exists a limit below which the creep is zero for a given temperature is as yet uncertain. However, a limiting stress for most metals and most temperatures can be found below which the amount of creep will not be disastrous in the desired life of the member. This whole subject of creep is such a recent development that we cannot say how important this test will be or whether any short-time tests for this creep will become feasible. It gives, however, promise of very great significance as a test value in connection with metals which have to carry stresses at high temperatures.

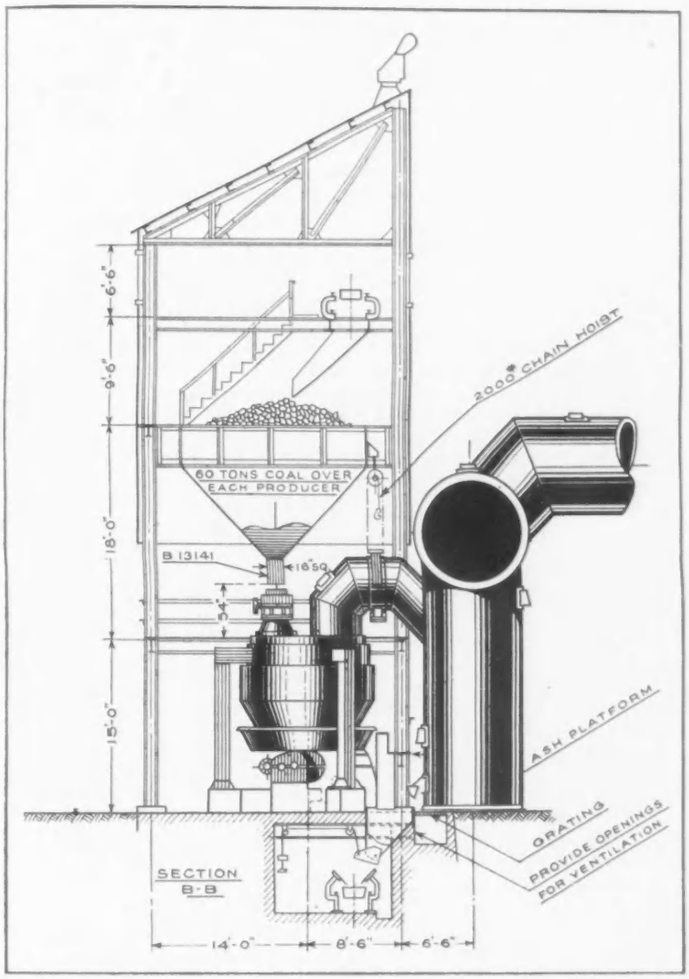
This discussion could be extended indefinitely—chemical tests, microscopic examination, hardness tests, shearing and torsion tests—and a score of other topics offer fertile fields for consideration. However, this is a paper, not a textbook, and the writer will close with a piece of rather trite advice. Let every testing engineer keep alive his interest in and his study of the technique of testing and also of the service significance of test results.

Canadian Pig Iron Output At Low Point

Production of pig iron in Canada in September, at 5709 gross tons, again established a new low monthly record. The further decline, however, was ascribed to the fact that September was a 30-day month, and no significant change was reflected in the daily rate in comparison with the August daily average. Output of steel ingots and castings and ferroalloys in September also dipped to lower levels.

September production figures and comparisons follow:

	Sept., 1932	*Aug.,* 1932	*Sept.,* 1931
Pig iron.....	5,709	5,992	17,585
Steel ingots and direct steel castings	23,139	26,710	33,390
Ferroalloys ...	732	871	5,174



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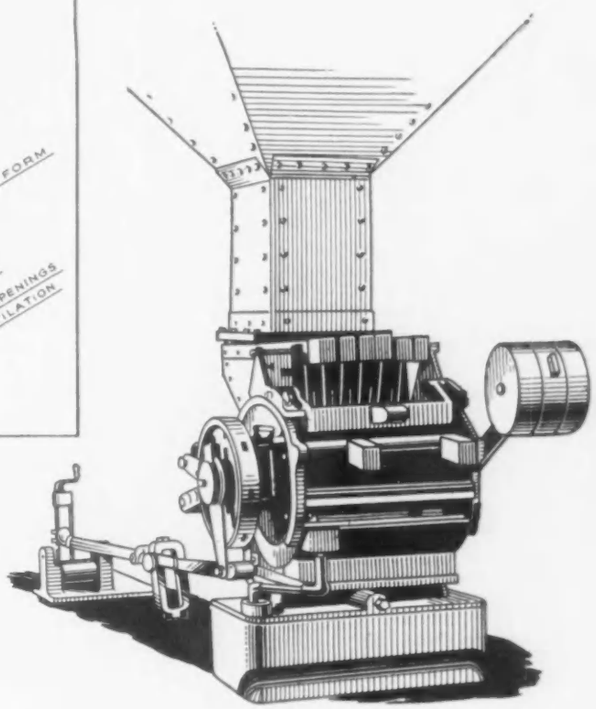

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ROLLING MILLS GAS PRODUCERS WIRE MACHINERY
COMBUSTION CONTROLS

Steel Industry Must Become Distribution-Minded

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lution to suggest, other than the obvious benefit to the industry in giving united effort to the solution.

New Market Map Must Be Surveyed

Market research has already made considerable progress in the industry. In this connection, however, we must not forget that the market landscape has been materially altered by the succession of economic earthquakes through which we have passed. Past statistics of potential consumption outlets are not of much use today. A new market map must be surveyed.

The vast body of your customers are those the sale of whose products or equipment or services represents the resale of steel. What affects their markets also affects yours in equal measure. The probable demand for their goods and services constitutes the outlook for the steel industry. Many of the individual resale units that were your best customers of former days may not be as good customers in the future. Smaller and more flexible and aggressive units in these industries and others, less handicapped by debt structure and with much to gain and not so much to lose, will come to the front. A tremendous shift of relationship of units in industry is occurring and will continue, as is also a tremendous shift in the engineering and buying personnel of surviving plants.

In large measure the coming years will represent a new deal of well shuffled cards. A new deal represents new opportunity for the skillful player. Certainly the future of the game will be very largely determined by how the steel industry plays its aces of market research and sales promotion.

The Importance of Plant Rehabilitation

To escape from the deadly level of profitless selling of its larger tonnage lines, the industry can afford to leave no stone unturned, in production as well as in distribution. Permit me therefore to say a few words regarding plant rehabilitation, although it will be perhaps carrying coals to Newcastle to mention this in Pittsburgh, the headquarters of the chief apostle of the movement, A. W. Robertson.

It has been my privilege to see Mr. Robertson and his organization in action in this matter in various parts of the country. They are doing a real job for the industry, for we have evidence that the work is taking effect and you know that the rehabilitation or modernization of plants and equipment means the use of steel.

The story is a simple one. In a nutshell it is this. Buy your future cost savings at the present low market price, in view of the fact that the long-term outlook is once more favorable. The same rule that has built fortunes for conservative investors in securities. The same simple rule that Andrew Carnegie followed each time that a depression gave him the opportunity.

I know that you all enjoy seeing Mr. Robertson feeding this helpful medicine to your prospective customers, but I wonder if some of you would not also be better for taking a dose of it?

A great many of the older mills, and this includes some of those of the large companies, cannot compete in a buyers' market with the modern mills of the past few years before the depression. Many mills only 10 or 15 years old are obsolete. Now is the time for capital investment in plant modernization because machinery manufacturing concerns that have developed new processes, methods of manufacture and rolling can afford to supply time for engineering investigation and shop construction at a lesser price than in all probability the future will permit. It is also timely because of the necessity for plants to be similarly equipped by most improved methods to enable them to meet competition.

The growing demand on the part of the purchaser for an improved product can only be met through the latest developments in the art of handling and rolling of steel. And this applies throughout the industry from the blast furnace to the finished product.

Technical Research Operates in Three Planes

If market analysis and effective promotion are the aces of the steel industry, technical research is its wild deuce. It fits in as a master aid in marketing, just as it fits into production.

Far be it from me to attempt to enlarge upon the value of research to this audience. You know what it has done from first-hand experience, and know what it is capable of doing. I will confine myself to laying before you a conception of research as occupying three parallel industry planes, from each of which it affects steel demand.

Below the steel industry proper is a plane upon which rest the suppliers of materials and equipment to the industry. And above the central plane, upon which rest the steel producers, is another plane upon which rest the industries which work or fabricate steel for resale in the form of machinery or metal products.

The interests of those occupying these three distinct but parallel planes are diverse in many respects, but converge with respect to the common objectives of progress and profits.

Research has established idea-generating stations upon all three of these planes and sends its progress and profit stimulating currents back and forth from one to the other. Let us see how this works.

Research by Suppliers of Material and Equipment

On the plane below that occupied by the steel producers we note the research activities of such companies as the International Nickel Co. in developing new uses for nickel in steel, cast iron and alloys; of the Union Carbide & Carbon Co. in the development of various ferroalloys, and the Vanadium Corpn. and many others. On this plane also we find the development of the electric furnace and the many improvements in modern furnace and mill practice resulting from the research and study of those who sell materials, equipment or engineering services to the steel producers.

These concerns on the lower plane conduct such research, of course, with the immediate purpose of improving their own business, but they accomplish this, in large measure, in proportion to the improvement that their research and development effect in the plane next above them, which represents your business.

Research by Steel Consumers and Producers

On the top plane of the three we find even more diversification of research, since product complexity increases as we move nearer to the final consumer. Here, in the metal-working industries which reshape and resell steel, we observe the tremendous research activities of our great electrical equipment manufacturers, the motor car builders, certain of the railway equipment builders and many others. All of this, in times at all normal, exerts a substantial pull upon steel from above.

But steel, on the intermediate plane, is not, and should not be, content with a push from below and a pull from above. It has its own generating stations in the form of this and other bodies, both cooperative and individual, which are doing splendid work. Now, however, in view of the outlook, this work must be intensified and directed toward distribution.

We must raise the voltage and increase the amperage flowing from our steel-producing plane to that of the steel-using industries. The metal-working industry is hungry for new and improved product appeal to stimulate consumption of its machinery and merchandise. Never before has there been so much need, on the upper plane, of the push from beneath which

(*Concluded on Advertising Page 20*)

METAL FORMING *by* HYDRAULIC POWER

Hydraulic power has fast gained recognition as a useful force in forming, bending, drawing and other operations in working metal, because of its simplicity and flexibility. It is unexcelled for exerting a wide range of pressures without the intervention of complicated toggle, screw, crank, or gear train mechanisms.

The latest development in the application of hydraulic pressure is the self-contained press actuated by means of individual pump equipment. Such a press has the advantages of smooth, positive action under any load, absence of vibration and noise, minimum floor space and low foundation, installation and maintenance costs. In addition, the pressure, stroke and amount of opening between the platens can be varied at will to suit diverse operating conditions.

The operating medium is oil, which is supplied to the cylinder by the motor-driven pump mounted on top of the press. Oil is an ideal fluid medium for hydraulic press operation because, in addition to supplying the operating force, it also acts as a lubricant, preventing wear of moving parts, lengthening their life and reducing maintenance.

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Farrel-Birmingham presses of this type are designed for any specific requirements . . . any size . . . any capacity . . . any pressure . . . any combination of movement or speed.

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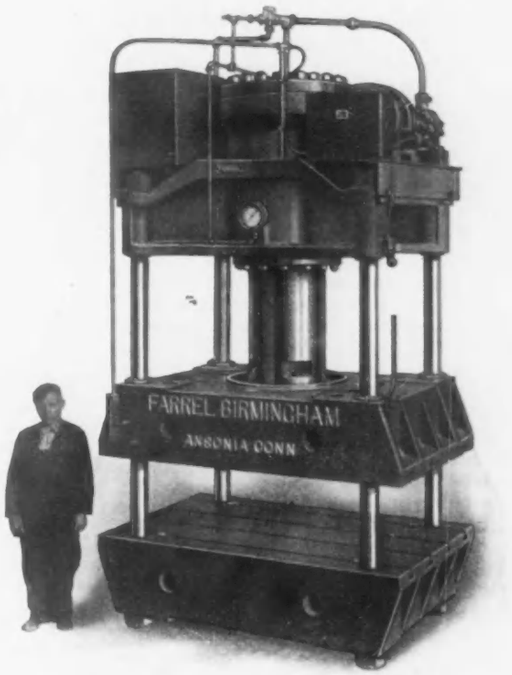

Farrel-Birmingham Hydraulic Metal Forming Press. 200 tons capacity, 24" diameter ram, 24" maximum stroke, 49½" x 80" platens.

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1. Self-contained
2. Positive control
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research in the steel industry can now provide.

Finding Supremacy Areas for Steel Products

Research, on this middle plane of ours, can also be of tremendous aid to steel merchandising by more accurately defining the supremacy areas of various products for given purposes. Not the geographical areas of distribution—that is another problem—but the technical areas of usage.

Nearly every product and nearly every material excels for certain purposes and is excelled for others. The boundary lines of the supremacy areas are often vague, and necessarily so considering the vast complexity of usage and the constant development of new applications. The more clearly the maker, however, can define the supremacy area of his product in terms of usage, the less will be the sales resistance encountered. Demonstrable superiority for a given purpose is the most powerful sales argument. But it implies definite knowledge of both limitations and advantages in terms of proposed usage.

Steel, for example, does itself no good in competing against aluminum or wood or concrete for usage in which one of these other materials will eventually prove to be superior. Even though price or sales eloquence may turn the trick, usage will eventually turn to that which can best serve it. "Seek the truth and the truth shall make you free" is a fine motto for research and for buying and selling also. The time may well come when competing industries and competing individuals will get together to determine the relative supremacy areas of their products, rather than leave this to the much more costly process of being settled by cut-throat competition.

Existing Opportunities Not Fully Exploited

I said, at the beginning of this talk, that the outlook for steel was "tough." I did not say it was poor. It will be what we make it.

Even the "S" curve of steel production becomes less ominous when you consider that it is the graphic record of a production-minded industry. It is the record of what you have done, not what you can do.

If you had been scoring somewhere near par in the distribution game, I would feel more dubious about the outlook.

Can any of us believe that we are nearing the saturation point with regard to the application of steel even with respect to mankind's already existing needs and uses?

I have seen wooden desks and wood wainscoating even in steel company offices. In this hotel, in Pittsburgh, headquarters of the steel industry, I note there is considerable opportunity for steel to play a larger part. Tonight, most of you who go home will put keys into wooden doors. Many of you, like myself, still sleep in wooden beds and live in homes of wood or brick or stucco. The sidewalks surrounding them are of cement or stone or tile. The steps leading up to them are not of steel, although a grudging concession may be present in the form of a pipe handrail. How many of the windows that you look through day by day have steel sash or casements? How many of you have as yet put your legs beneath a steel dining table, and how many of us have not "cussed" the buffet or serving table or humidor whose wooden doors have stuck after the furnace was "let out" in the spring? How many of you crossed concrete bridges this morning in coming to the city from the suburbs? Just a few are these, for example, of the present known purposes where steel has not done all it might. And you could multiply the list ad infinitum.

Add to these the new opportunities that are now unfolding in the intensely stimulated research for new and better products on the part of those who resell steel in the form of machinery or metal products. There was never a time, in these upper level industries, when a push from beneath would be more acceptable, or where it would be more fruitful of results for the steel industry to exert it.

No, the outlook may be tough, but it is not poor. There are no hazards facing the industry that cannot be overcome through earnest and honest cooperation, no collective or individual problems of distribution that will not yield to research, analysis and education conducted by a distribution-minded industry.

If steel is at last awake, and I think from what is now going on in the industry that it is, its future opportunities may be even brighter than its performance of pre-depression days. Under the powerful influence of organization, cooperation and determination, with its mind attuned to scientific distribution, with so many remaining opportunities for self-improvement, this great basic industry, shaking off the shackles of tradition, will cross this present Red Sea and eventually arrive at the promised land of profits.

All-Welded Steel Tie

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items may vary slightly in different locations, these costs are believed to be fairly representative. They are shown in detail in an accompanying table. Briefly, the steel welded tie costs about $3.99 and has some scrap value, while the treated wood tie costs up to $3 and has no scrap value.

Maintenance costs are more than 50 per cent less with steel ties than with wood because the gage is rigidly maintained. No periodic replacement of the ties is necessary and the grade and alinement have shown little or no change over a period of several years. The railroad has found it possible to reduce the maintenance forces by one-third on the divisions where all-welded steel ties are in use. The company engineers estimate that 40 years of service should be obtained from these steel welded ties.

Some 55,000 to 60,000 all-steel welded rail ties are now in use under about 25 miles of the railroad's siding and yard tracking, located principally at Carbondale, Pa., Scranton, Pa., and Oneonta, Plattsburg and Rouses Point, N. Y. Special-length, all-steel welded ties are being used for crane runway tracks and for turnouts, cross-overs and switch-stands. The all-steel welded tie has been readily accepted by the section superintendents to the extent that there is always keen competition as to who shall receive the various shipments of ties. An important point in this connection is that it is necessary to lay only about 2600 steel ties per mile as against 3100 of the wood ties.

Marketing Conference to Be Held at Pittsburgh

The industrial marketing division of the American Management Association will hold its annual conference at the Hotel William Penn, Pittsburgh, Dec. 5 and 6.

An address on "How to Make Industrial Sales Now," by H. P. Bailey, president Rotor Air Tool Co., Cleveland, will be followed by a round table discussion, and "Industrial Sales Pricing Policies" will be reviewed at another session by H. S. Beal, general manager Jones & Lamson Machine Co., Springfield, Vt., and president-elect of the National Machine Tool Builders' Association.

President Hoover's program of rehabilitation and modernization and the opportunities it affords for industrial salesmen will also be discussed, and L. B. Williams, vice-chairman, Federal Reserve Bank, Fourth District, will address the meeting on "Applying the National Credit Expansion Program to Industrial Salesmen." F. B. Heitkamp, sales manager, Cincinnati Milling Machine Co., will speak on "Maintaining Sales Organization Against the Time of Business Revival." A paper on the "Trend Toward Expansion of Free Service" is also planned.

C. J. Stilwell, vice-president Warner & Swasey Co., Cleveland, is vice-president in charge of the A. M. A. marketing division.

Shipments of enameled sheet-metal ware in August rose to 202,847 doz., valued at $674,355, as against 169,974 doz., valued at $559,496, according to reports received by the Bureau of the Census from 15 manufacturers.